A Database Publication

THE MICRO USER

Volume 5
Number 5
July 1987
£1.25

Top-selling guide to the BBC Micro!

BASIC
Program writing made simple

GALLERY
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FUN
Two super games for you to play

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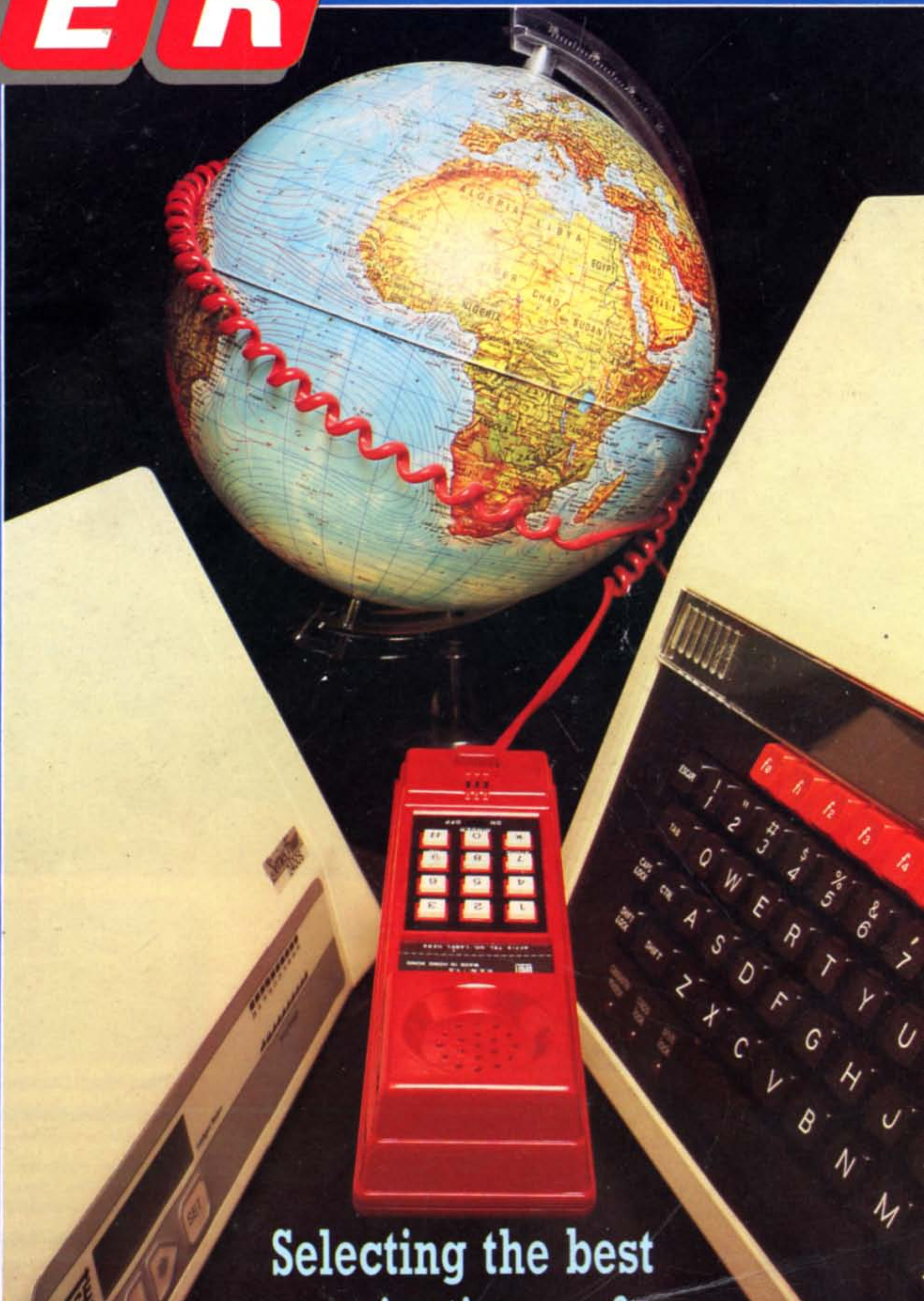
Selecting the best communications software

GRAND PRIX
CONSTRUCTION SET

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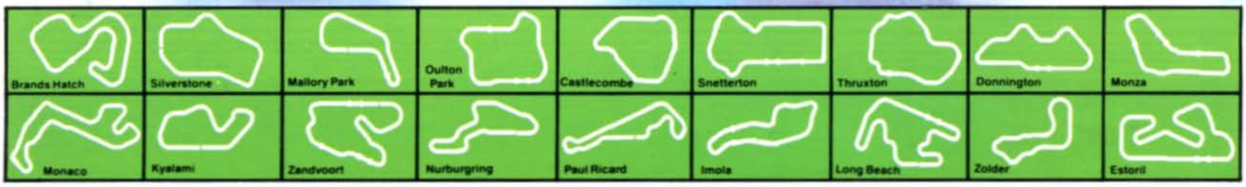
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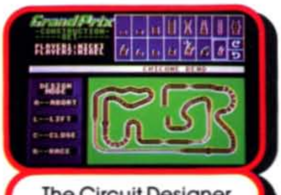
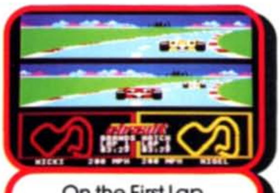
Drive into a New Dimension

Grand Prix Construction Set is a motor-racing game with a difference: it allows you to design your own race circuits — using straights, fast bends, sharp bends, chicanes and hump back bridges. Or you can select one of the many pre-defined race tracks, which include most of the world's famous Grand Prix venues. Then race against another player, or against the computer — there are 5 skill levels to choose from.


Grand Prix Construction Set

The Circuit Designer



On the First Lap

Features of the Game

- Easy-to-Use, Icon-Driven Circuit Designer
- Save and Load your own Track Designs
- 18 Pre-Defined Grand Prix Race Circuits
- 1-Player and 2-Player Options
- Spectacular Split-Screen View of the Race
- Dramatic Skids and Crashes

BBC Micro cassette	£9.95
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BBC Master Compact 3½" disc	£14.95

Grand Prix Construction Set is compatible with the BBC B, B+ and Master Series computers.

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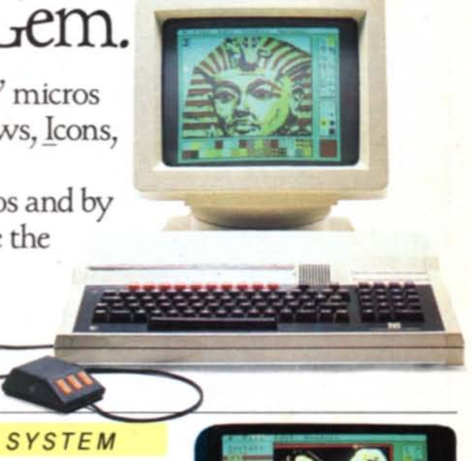

It's no surprise that nearly all new 16 bit 'state of the art' micros now come with a Mouse and Wimp environment (Windows, Icons, Menus and Pointers) as standard.

With the BBC you already own one of the classic micros and by simply adding the AMX range of software you can achieve the same ease of use, freedom and versatility of much more sophisticated computers.

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There's not much joy in a joystick and keyboards can be all fingers and thumbs. Acclaimed by the press as 'the best input device', already over 30,000 BBC users have adopted an AMX Mouse. Available for the BBC, B+, Master 128 and Master Compact. Please state version when ordering.

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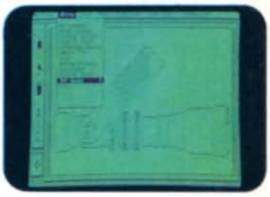

There is also a growing list of additional AMX software requiring the original AMX Art Rom or Super Art Rom including:
AMX 3D Zicon **£24.95,** AMX Database **£24.95,** AMX XAM **£24.95** AMX Mind Games **£14.95,** *AMX Utilities **£14.95,** *AMX paint Pot **£14.95.**
*These programs are only suitable for use with the original AMX Art/Rom which can be purchased with a mouse for **£69.95**
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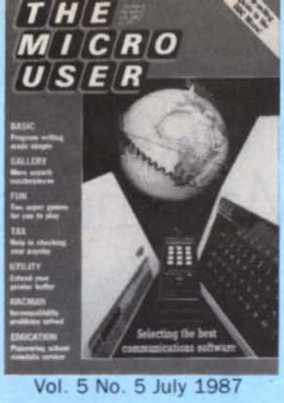

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Jan-June 1986

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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The chance to get your news, views, moans and name into print.

SPECIAL

THE MICRO USER

investigates the power of Basic

Four clever utilities in this issue, together with helpful features from our experts, help you bring out the true power of the built-in language of your BBC Micro. When you see this symbol:

Basic

you know that the feature is specifically designed to aid your programming.

Knitwear Designer

There was an enormous response to last month's program to create a knitting pattern on your BBC Micro. This month we unveil a new five-program package: Knitwear Designer. More details on Page 79.

NEXT MONTH

MAMMOTH MUSIC ISSUE
MIDI Revealed
Music Compiler
and more...

PREVIEW
The future is here

UTILITIES
Ram Arrays
Address Book

THE MICRO USER
August issue on sale July 1

Get knitting on your micro with

Knitwear Designer

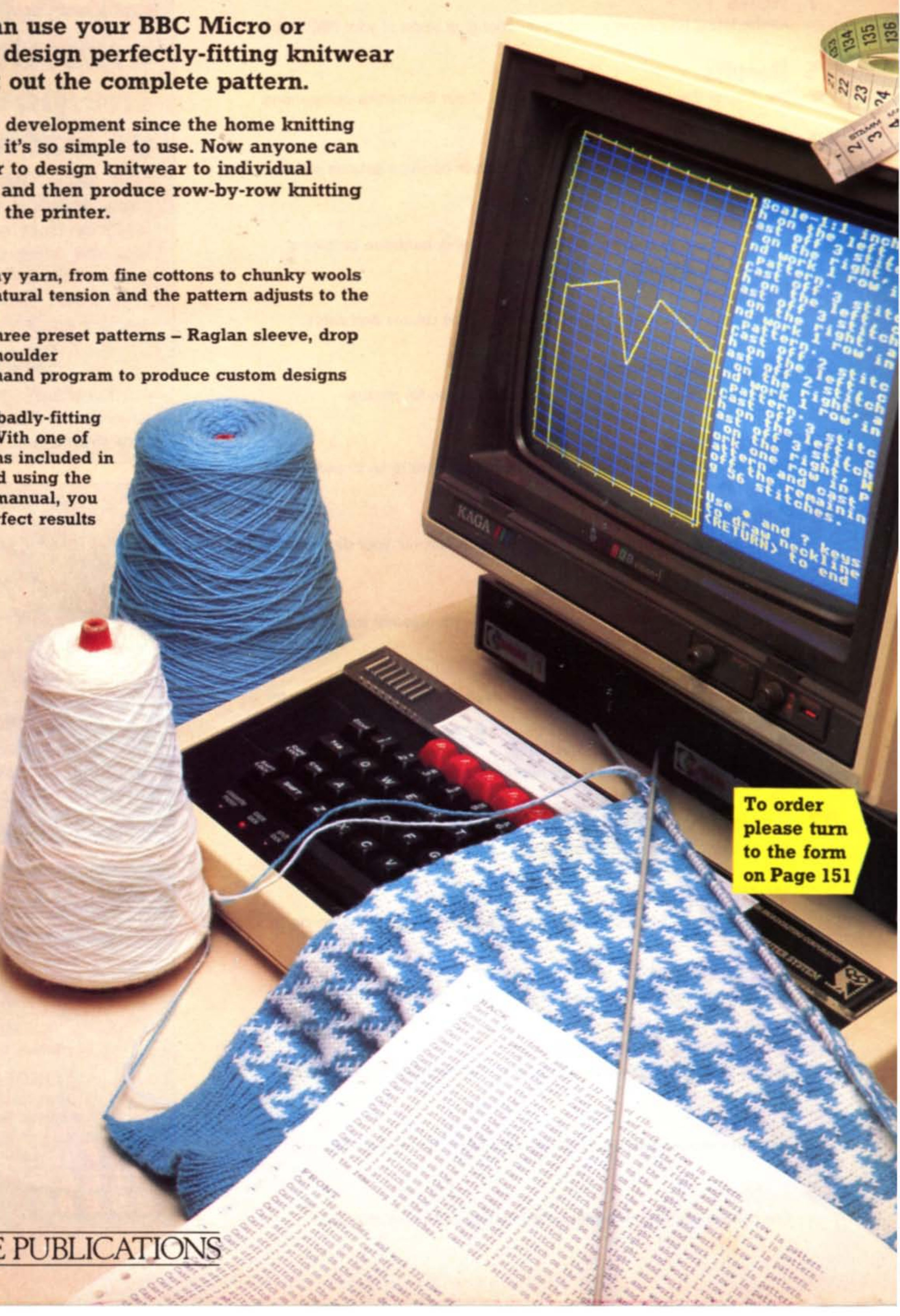
Now you can use your BBC Micro or Electron to design perfectly-fitting knitwear – then print out the complete pattern.

It's the biggest development since the home knitting machine – and it's so simple to use. Now anyone can use a computer to design knitwear to individual measurements and then produce row-by-row knitting instructions on the printer.

YOU CAN:

- Work with any yarn, from fine cottons to chunky wools
- Enter your natural tension and the pattern adjusts to the way you knit
- Select from three preset patterns – Raglan sleeve, drop and square shoulder
- Use the Freehand program to produce custom designs

Say goodbye to badly-fitting home knitting. With one of the five programs included in the package, and using the clearly written manual, you can produce perfect results every time.



To order please turn to the form on Page 151

£8.95
Cassette

£9.95
5¼in disc

£10.95
3½in disc

DATABASE PUBLICATIONS

THE MICRO USER NEWS

ENTER the Watford mouse stage left.

It took its bow complete with supporting cast of top photographer, leading disc jockey and a cross-eyed cat.

The photographer in question is one Paul Francis of Manchester.

His assignment? To come up with a cross-eyed cat to feature with the new Watford mouse on a promotional poster.

Now there just doesn't happen to be a listing for cross-eyed cats in the Yellow Pages.

Enter disc jockey Rebecca Want from Piccadilly Radio. At Paul's request, she put a call out on her programme for the owners of any such beast.

Within minutes the phone lines of the Francis Studio were clogged with owners eager to offer their squinting moggies. Pussies galore, in fact.

Several days of cat viewing later, Paul found Suki the Siamese. The rest of the story can be found on the posters that will eventually come from Watford.

As for the Watford Quest Mouse itself? It arrived complete with Quest Paint software at the latest Electron & BBC Micro User Show (see review on page 46)

The cat's verdict? Its purrfect . . .

Ultra-fast micros ready for launch

ACORN is poised to launch the first of a family of micros which is believed to be the fastest in the world.

Though the company is unwilling to reveal any details, it is now accepted that the announcement will take place shortly.

It is possible to build up a picture of the new machines as they are known to be based on the 32 bit RISC chip developed by the company's own boffins.

Reports from the States – where the new technology is being manufactured under licence – reveal that the latest version of the processor performs at 14 mips (million instructions per second).

That would mean that the Acorn models would be seven times faster than any micro currently available.

In fact they will be able to outperform the BBC Micro by a speed ratio of 70 to one.

These facts were first reported exclusively in last month's issue of *The Micro User*.

So too was the news that the entry level machine is likely to cost less than £1,000.

The reason that Acorn has been able to keep the price down is that the cost of manufacturing the RISC chip is substantially less – a factor of 10 is believed to be the difference – than that of the 68000 processor used in most leading 16-bit machines.

What has been learned since then is that the BBC has already agreed to lend its name, and that the RISC-based micros will provide dream graphics, with 256 colours on screen at once from a palette of 4,096.

Sound generation is also likely to be superb, making it a perfect synthesiser vehicle.

At the same time the new machines will be capable of emulating other operating environments, including that of the BBC Micro.

"If what I've heard is true, Acorn has a world beater on its hands", a usually well informed source told *The Micro User*.

Support on the line

A SUPPORT package for business and communications software users which includes membership of MicroLink has been launched by systems consultancy and software design firm Interlex.

It is available to BBC Micro owners through leading High Street stores and dealers supplied by distributors Softsel and Centresoft.

The £29.95-a-year package has been designed to serve users of the growing amount of lower-priced business, comms and utilities programs.

In addition, MicroLink will provide Interlex members with the bonus of electronic mail, telex, databases and other communications facilities.

Interlex managing director Mike Lane said: "As the trend toward low-cost software has gathered momentum, the traditional dealer network has moved upmarket.

"Consequently the bulk of new business software users have been left totally unsupported because the High Street and volume sellers supplying them are not geared up for the task.

"Interlex will fill the vacuum by supplying support at a price the new generation of users can afford.

"Initially this will be provided through a telephone hotline, but we are pushing ahead with plans for an Interlex bulletin board on MicroLink to extend the service to comms users".

Ocean get Platoon

OCEAN Software has acquired the rights to publish a game based on the Oscar-winning film Platoon.

Said the company's chairman, Dave Ward: "Platoon does not contain the political rhetoric of Rambo, yet it has been a tremendous box-office success in the USA.

"Despite all the critical acclaim and publicity, we have not been rushing to produce this program.

"In computer entertainment the victorious soldier is usually the hero. In this film the heroes are much more complex. Therefore there is a lot of work and thought required to create a stimulating product".

Platoon will be available for the BBC Micro shortly.

It was all go at the Show

The London Marathon may have taken place the same weekend but the real winners were to be found at the 16th Electron & BBC Micro User Show. A survey of exhibitors showed that visitors saved themselves in all more than £500,000 by attending the three day event.

This came about as a result of them taking advantage of more than 200 special show prices.

"We were delighted to see the way the exhibitors once again joined in the spirit of the occasion," says Derek Meakin, head of Database Exhibitions. "They offered special show prices on everything from hardware costing several hundred pounds down to budget priced software".

But there was far more to the show than just bargains. Once again it was transformed into a showcase for everything that's new in the BBC Micro and Electron marketplace.

Here Mike Cowley and Lorraine Alcock report on some of the highlights . . .

Graphics 'due for a boost'

A FORECAST that within two years games running on BBC Micros will boast graphics comparable with those on the inlay cards has come from a leading developer.

Dave Croft of Tynesoft (091-414 4611) believes that the technological breakthrough to achieve this is just around the corner.

"Our programmers are working to improve graphics all the time", he revealed during a break from exhibiting, "and we are expecting that the major advance will come from a possible combination of video and computer images".

Dave Croft currently heads a team of five in-house programmers and 12 outside writers working for Tynesoft.

Such is their success that the software house is considered to be a front runner in the industry. One of its titles, Winter Olympics, has now been in the bestselling charts for more than a year while another, Commonwealth Games, has been in the Top Ten for the six months since it was launched.

Last year Tynesoft broke through the £l million sales barrier for the first time.

"Our sales in the BBC Micro and Electron markets account for a sizeable amount of this", Dave Croft told *The Micro User*.

"As far as we are concerned it is a brilliant market for games – but they have to be good".

Tynesoft's Dave Croft

Peartree's Vartan Mundigian

Winning smile

PEARTREE Computers were found making music on the BBC Micro. Or to be more accurate on Music 5000, their bestselling synthesiser package. It also promoted its soon to be released Music 7000, theenhanced model.

To be priced at £79.95, it includes a number of new features, with software available to upgrade the Music 5000 or the original Music 500.

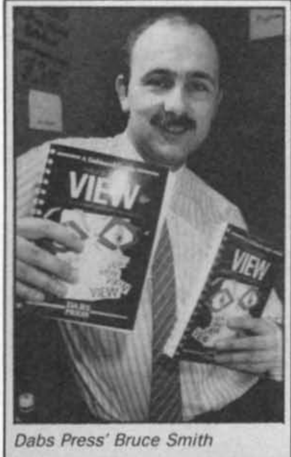
"We have produced this in-house, so have managed to keep the cost down," explained Vartan Mundigian of Peartree (0480 50595).

Torch back on show...

TORCH Computers, established six years ago, decided it had kept too low a profile over the last 18 months.

But that's all to change. "We wanted people to know we are still around as add-on suppliers, and decided the Show was the best place to be seen", said the company's Sarah Parsonage. "It's the first one we have been to for quite some time, and we've been delighted with the response, particularly from existing customers".

The company, based in Cambridge (0223 841000), had a host of new products available from floppy discs to new hard disc facilities for the BBC Master.



Dabs Press' Bruce Smith

Desktop road to success

WITHOUT desktop publishing new show exhibitor Dabs Press would never have been formed, says Bruce Smith, computer journalist, author, and one of the two men behind this new venture.

His partner is Dave Atherton, a former software manager with BBC Enterprises.

Said Bruce: "We found a lot of publishers were not covering the BBC Micros. Dave and I are friends and we were talking about this one day and decided to give it a go.

"But we would not have stood a chance without desktop publishing".

Dave added that they did not have enough finance to employ outside help. So they looked into desktop publishers, invested £5,000 and can now turn out 1,000 pages in just three days.

The first title from this Manchester-based publishing house (061-773 2313) is View: A Dabhand Guide written by Bruce, who already has 18 computer books to his credit.

Covering all aspects of using the View word processor, it is described as a comprehensive tutorial and reference guide for both the advanced user and beginner.

The book costs £12.95. Program discs are also available.

TOP MARKS FOR COLIN

WHEN 13-year-old Colin Chappell devised his first computer program, he decided the ideal customer would be his school.

Teachers at Welling Secondary in Kent gave top marks to the program, French Tenses, and that gave Colin the incentive to carry on.

Now, four years later and still at school, Colin Chappell operates Chestnut Software (01-308 2981) from his home in Bexleyheath.

And he took time off from studying to exhibit at the Show. "We took a stand at the November Show and carried out some market research", said Colin. "We learned a great deal then, and decided it was worth coming back".

Christopher Read (left) and Colin Chappell

Producing games with an educational basis for the BBC Micro, he is helped by another 17-year-old, Christopher Read, who acts as sales and marketing manager.

Explains Colin, now a pupil at Bexley Grammar: "I divide my time between school and Chestnut Software. I'll be sitting maths and computer science A levels next year".

Meanwhile the enterprising duo were given the backing of their local council.

They showed their software to the education department and business development unit of Bexley Borough Council, which now includes Chestnut's programs at its educational software open days.

There's Tommy Turtle and French Tenses. Also, based on the detective books by Martin Waddell, Chstnut offers a "solve it yourself" series of five Mystery Squad programs.

Two new releases, which were unveiled at the Show, are Enigma, a dice game for two to six players, and Tipster, where analyse race data to predict the winner.

Enigma, £4.95 on tape and £6.95 on disc, and Tipster, £3.95 on tape and £5.95 on disc, are available on the BBC Micro and Master 128.

Market's choice

WHEN Jim Daniels wrote a scrolling and drawing program to provide large diagrams back in 1985, he decided to launch it at the next Electron & BBC Micro User Show.

At that time, he expected sales to last at best some six months. Now, two years later, Diagram is still going strong for his company, Pineapple Software (01-599 1476)

"It's amazing the way this market seems to go on for ever", he said as he exhibited at the Show once again.

"Our monthly sales figures for this product have been virtually identical since we started".

However this show witnessed the unveiling of a totally revamped version of Diagram. It now offers 900 user-definable characters, all stored in memory, as compared to 128 for the previous package.

"I'm not bothering to make any forecasts about how long this one will sell," he said. "I'm just waiting to be pleasantly surprised".

Pinapple Software's Jim Daniels

Master package

THE only business package to make it into the bestselling charts is now available for the BBC Master and Master Compact.

Database Software selected the show as the launch pad for the two latest versions of Mini Office II.

The award-winning title recently achieved a world first by storming its way into the Gallup Top 40 all machine format list.

Mini Office II contains six modules – word processor, database, spreadsheet, graphics, label printing and communications.

It is priced at £19.95 on 5.25in disc for the Master and £21.95 on 3.5in disc for the Compact.

THE GALLUP CHART TOP 20
BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software House)	PRICE
1	•	**Grand Prix Construction Set** *(Superior)*	9.95
2	▲ 4	**Superior Collection Vol. 2** *(Superior)*	9.95
3	▼ 2	**Superior Collection Vol. 1** *(Superior)*	9.95
4	▼ 1	**Ravenskull** *(Superior)*	9.95
5	▼ 3	**Big Ko** *(Tynesoft)*	7.95
6	▼ 5	**Repton 3** *(Superior)*	9.95
7	▼ 6	**Micropower Magic** *(Micropower)*	7.95
8	▲ 9	**Commonwealth Games** *(Tynesoft)*	6.95
9	▼ 8	**Stryker's Run** *(Superior)*	9.95
10	•	**Firetrack** *(Electric Dreams)*	9.95
11	▲ 12	**Thunderstruck 2** *(Audiogenic)*	7.95
12	▼ 10	**Mini Office II** *(Database)*	14.95
13	▼ 7	**Winter Olympics** *(Tynesoft)*	7.95
14	•	**Sphere of Destiny** *(Audiogenic)*	7.95
15	▼ 13	**Computer Hits 10 Vol. 3** *(Beau Jolly)*	9.95
16	▼ 12	**Sentinel** *(Firebird)*	9.95
17	▼ 15	**Trivial Pursuit** *(Domark)*	14.95
18	◄ 18	**Crystal Castles** *(US Gold)*	9.99
19	▼ 17	**Colossus 4 Chess** *(CDS)*	9.95
20	▼ 14	**Dunjunz** *(Bugbyte)*	2.99

Compiled by Gallup/Microscope

Superior has six games in the Top Ten this month – with Grand Prix Construction Set going straight in at number one. Firetrack, a superb shoot-'em-up, materialises at number 10. It was written by Orlando, author of Frak! and Zalaga, and should do extremely well.

NEWS

Picture frames program in action

Micro in the picture

THE BBC Micro has been framed. An art expert has decided to put his colleagues in the picture.

John Fobester was going round the bend trying to work out how much framing stock he had, where it was and how much it cost.

He decided to show he wasn't a square, and set about designing a computer program to help him.

Once he was sure he was in the right mould, he called in software experts and had the program written for the BBC Micro and Master.

Now the masterpiece is going on the market. It was on display at the International Prints, Framing and Art Fair in London at the end of March.

Published by John Fobester's firm, Southdown Fine Art, in Brighton, The Framer's Complete Manager needs two disc drives.

The program is aimed at non-technical users and designed to run the whole retail outlet, from keeping stock to pricing orders and printing price tags. Price £450.

Document-based DTP program

WHAT is claimed to be the first document-based desktop publishing program for the BBC Master series has been released by Ibbotson Design Software of Derbyshire.

The company has published iMAGiN.L, as a follow up and companion to iMAGiN.A, its artwork designer, though the new release should work with any graphics program running on the Master and using dot matrix printers.

Ibbotson (077-389 659) says the new product "improves on other DTP programs for the BBC Micro.

"While having full control over the layout of every page you work with a whole document of up to 100 pages; page numbering allows documents to be linked to extend this limit to 1,000 pages.

"It prints using the printer's own typefaces, making available all the modern dot-matrix facilities. It is also fully WYSIWYG".

AT PL Advanced Technology Products Limited

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Chesterfield, S43 4AB.
☎ **(0246) 811585 (4 lines)**

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NEWS

FREE
FOOTBALL MANAGER
BBC Model 'B'

AFTER buying £60,000 worth of Addictive Games, Prism Leisure (01-804 8100) is relaunching Football Manager for the BBC Micro.

Available for the first time in a double cassette package, the game will cost £2.99.

Pattern for success

THE program in last month's *Micro User* showing how to use a BBC Micro to design a raglan-sleeved jumper and then print out the complete pattern sparked off an unexpected response from readers.

Letters and phone calls have poured in asking if the idea could be developed to allow for other garments to be designed on a micro.

The answer is that it already has. The program was part of a sophisticated suite written by knitting enthusiast Kendall Down that was far too long to use in the magazine in its entirety.

It is now to be published as a complete package of five programs, together with detailed instructions. With it you can produce patterns for square and drop sleeve pullovers and also design your own distinctive knitware. Details are on Page 79.

Kendall Down is a clergyman in North Wales who learned to knit when living in Kashmir with his missionary parents. It was his marriage, and the eventual need for baby clothes, that rekindled his interest in knitting.

BBC Micros can aid the blind

FAILING eyesight forced Vivian Daniels into early retirement from his job as director of the audio visual centre at Hull University.

But in the two years since then he has been busy creating computer-based aids for blind and partially sighted people like himself.

First he developed a talking database called Filing Cabinet which is now approved by the Manpower Services Commission and supplied to many blind professionals.

More recently he completed work on Vaslui Word – also MSC approved – a word processor which runs on the BBC Micro and Master in conjunction with a speech synthesiser.

It is being marketed by the Vaslui Trust (0242 575077), a registered charity set up last year to support medical projects for the relief of eye disorders in underdeveloped Commonwealth countries.

Vaslui Word runs from floppy disc and the entire keyboard character set is spoken. No supplementary screen reader, speech chip or second processor is required.

The user is able to write new texts, put them on disc for later use, read them in comfort, print and edit them.

Instead of cursors the program contains a "talking window" through which the text is viewed, and the user always knows its precise position on the screen.

Vaslui Word handles text as though it were already laid out, the processing and formatting are continuous and there is no unformatted text. Text is handled, not by screen content but by the printed page format.

Verbal and audio prompts guide the user at all times, and most of them can be repeated on demand. The majority of editing is accomplished with only the six edit keys plus shift and control.

As the processor doesn't use embedded commands there is no table of printer codes to be memorised. Most operations including underlining, indenting, tabulation and line centering, are accomplished by a single keystroke.

Unintentional deletion is virtually eliminated since only text which has been identified in sound may be deleted. Document length is limited only by disc space.

During keyboard input the processor provides all the usual facilities of keyboard echo, a choice of bleeps to indicate either upper or lower case and a talking eraser. Price £52.50.

Have a go scheme

A "Have-a-Go-Micro" scheme has been introduced at a Northern library to give the uninitiated a chance to find out what a BBC Master is all about.

The idea is that people book an hour on the machine and then spend the time discovering its capabilities, using disc-based software provided.

Peter Whitehead, Central Lending Librarian at Stockport Library said the scheme had had a good response.

"It is very pleasing to note that the age range is wide and that some older people who have never been near a computer before are using it", he said.

"Although there is no age restriction, the scheme was aimed at the older person who might be apprehensive about new technology but who wanted to know a bit more about it.

"Rather than enroll for a course straight away, they can come and use a computer without any pressure and see what it does".

NEW software has been produced to allow BBC Micro comms enthusiasts to cross the Channel. Aldoda International (01-586 5686) says "T" emulation software will allow access to Teletel, the French viewdata system which has become the most successful videotext service in the world.

The BBC software costs £28.50. The firm says that Teletel can be accessed via PSS at any speed. Costs are therefore the charge of a local phone call plus 7.5p a minute. A special gateway is planned to be set up to Teletel soon.

EYE FOR MASTER

WILD Vision has converted its Hawk V8 image analysis system for the BBC Master 128.

The package, which costs less than £1,000, enables video images to be written directly to the video display memory of the machine.

The data capture and transfer is transparent to the computer, leaving the microprocessor completely free to perform whatever image processing is required.

Wild Vision (091-281 8481) says the Hawk's speed of processing is unrivalled by similar systems because images are stored in the Master's own memory – and an external frame store does not have to be accessed. Images may be grabbed at the full video rate.

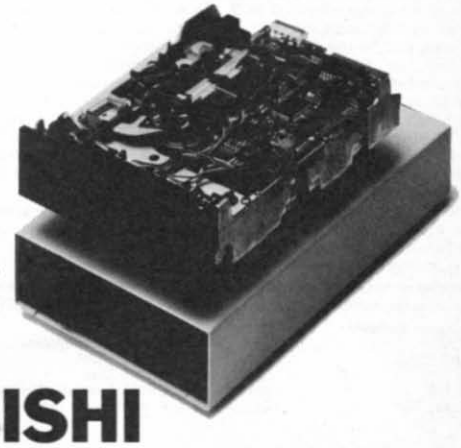
You may get a nasty result without a Mitsubishi Disk Drive

Using second-rate components can make your hardware bite back. Over the past three years we at Mitsubishi have sold over a million disk drives; a record that makes us very much number one in the market. But we don't impress just on quantity. There's quality too.

Both our 3½" and 5¼" floppy drives perform with the proven reliability that's made us one of the world's largest manufacturing companies. Within the units you'll find high compliant heads that ensure less wear on the diskette. If the power is switched off or interrupted, our circuitry prevents data from being corrupted. The units themselves are tough and durable, so they'll stand up to a lot of rough treatment and last longer. And because of their remarkably high precision, they enable far safer data interchange, even if the diskettes are worn or there's interference from nearby monitors.

So it's hardly surprising that the list of companies using our disk drives reads like a who's who of personal computer manufacturers. So don't get a mega-bite, ask for Mitsubishi by name.

Another example of Electronics from Mitsubishi.



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– NOW WITH ATS (Advanced Teletext System) SOFTWARE

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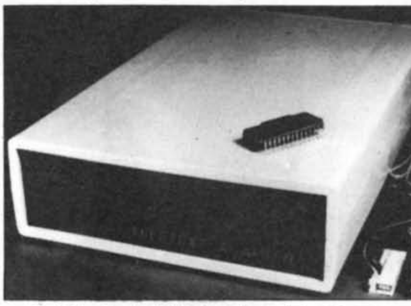
With the Morley adapter you will get a unit that automatically tunes itself in to the required station (no more messing around with screwdrivers in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

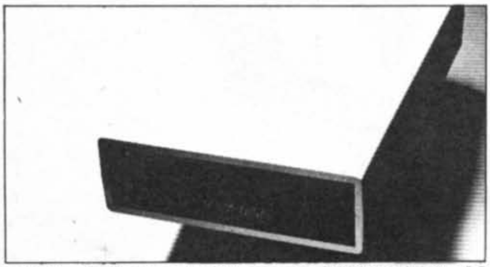
For technical details please ring Morley Electronics on Tyneside (091) 262 7507 after 4.00 pm

FEATURES

- Advanced design uses the latest technology will handle ANY future enhancements to the Teletext system eg: full field: 8 bit data transfer: 2k pages etc.
- Simply plugs into the user port.
- Low power consumption, less than 200ma. Optional power supply available.
- User friendly menu driven software including extended OSCLI and Osword commands for access from BASIC programs.
- 16K Support Rom allowing extended commands including printer dumps etc. included in package
- FREE Telesoftware, no access charges. (at present updated weekly.)
- Save selected pages to disc/tape for later retrieval.
- Full access to all Teletext services and channels eg: CEEFAX, ORACLE, 4-TEL.
- Gives you a real-time clock at your disposal (*TIME).
- Free software upgrades to allow for any enhancements to the teletext service. Eg: extra channels, full field data on cable & satellite systems etc.
- Easy to follow comprehensive user guide.
- No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- Works with Solidisc SWR.



- Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).



Now available the first true MEGA capacity RAMdisc for the BBC or MASTER computers.
This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, battery backup and a comprehensive user guide, add to this our usual 12 months no quibble guarantee and we're sure you'll agree Morley have done it again.

FEATURES

1 Megabyte of RAM connected to the 1 MHz bus.
Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase in speed, for example, a 20K mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc.
The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system.
Therefore ensures compatibility with any Acorn compatible DFS (not ADFS).
The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive no. is 4.
'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the * command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a * command.
The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.
Catalogue structure allows up to 2,709 files.

EPROM PROGRAMMER now available programs 8, 16 and 32k EPROMS connects to the user port software available on rom or disc.
Now programs new generation CMOS Eproms.
Deluxe cased with ZIF socket.

DESFAX 7 – Now you can run your own TELETEXT service! Incorporates the powerful editing facilities of DESIGN 7, again with Teletext adapter interfacing.
Stores up to 100 of your screen designs on a 40Tk disc or 200 on an 80Tk. Page selection by 3-digit number HOLD, REVEAL, page linking, individual page delays etc.
PLUS – a powerful CAROUSEL facility permits continuous slide-shows. Only one disc access for every 16 screens – reduces wear on drives. Smooth animation, variable speed text printing, built in printer dumps. Sample data disc and 22 page manual included. Beats all other systems for ease of use and versatility.

M/B software DESIGN 7

Easily the best value Mode 7 screen designer on the market today. Design any mode 7 screen, from simple MENU pages to full CEEFAX standard. This program is an invaluable aid. Designs can be saved to disc as automatically numbered files or the program will convert the screen into a Basic Proc.
INTERFACES DIRECTLY WITH ADAPTER allowing CEEFAX-ORACLE pages to be selected and dropped into editor screen for alteration, saving, or conversion to BASIC. Allows channel change from within program.

M/B software MASTER COPY

. . . the selective copier **you** need for the BBC MASTER computer . . .
Dramatically reduces the time taken to copy unprotected discs,
DFS to ADFS, ADFS to DFS, DFS to DFS, ADFS to ADFS
using one or two, single-ro double-sided drives.
An 84K RAM buffer enables many files to be copied in one pass with the minimum of disc swapping, and directories are created automatically as required. Files of any length are handled.
Supplied on disc, MASTERcopy runs form sideways RAM and is invoked with a * command. The program re-installs itself in sideways RAM when copying is done, ready for later use.
The ROM image supplied can be used to blow your own EPROM too, for use in the MASTER's cartridge slots.
Typical time to copy all 31 files DFS to ADFS is under 2 minutes!
£12.95 on disc – £14.95 for ROM version (including postage etc.)

For further details on all products call 091 262 7507 after 4.00pm

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40 TRK ☐
80 TRK ☐
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Qty. ☐ Master Copy Disc	@ £11.95 inc. VAT
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Qty. ☐ Teletext utilities on Disc	@ £5.95 inc. VAT
Qty. ☐ Optional PSU	@ £9.95 inc. VAT
Qty. ☐ 1 Mbyte RAM disc	@ £199.95 inc. VAT
Qty. ☐ 2 Mbyte RAM disc	@ £349.95 inc. VAT
Qty. ☐ Eprom Programmer V.2	@ £27.95 inc. VAT
Qty. ☐ Desfax	@ £23.00 inc. VAT

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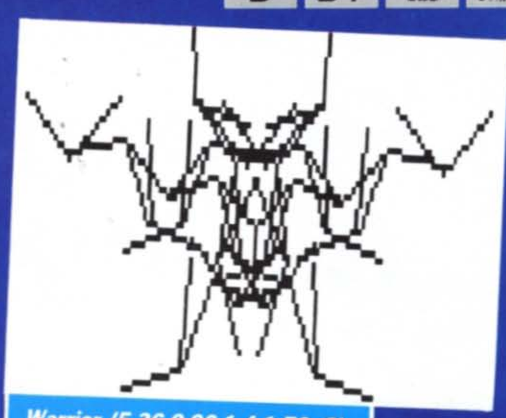
Please allow 28 days for delivery

A whole generation of Biomorphs!

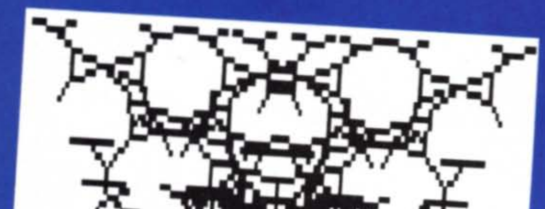
THERE was a tremendous response to the competition based around the Biomorphs listing in the May issue of *The Micro User.*

We asked readers to create their own biomorphs and give them names. The very best are displayed here, together with their gene values.

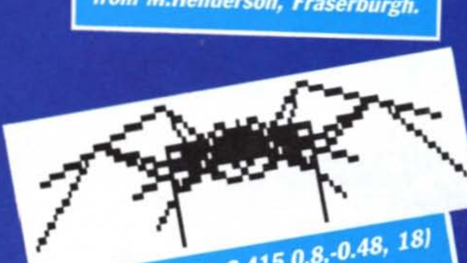
All eight winners will be receiving a hardback edition of Richard Dawkins' fascinating book, The Blind Watchmaker.



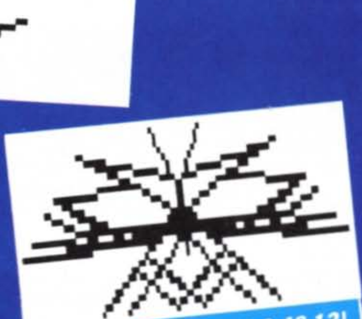
Warrior (5,36,0.96,1.4,1.76,-2) from M.Henderson, Fraserburgh.



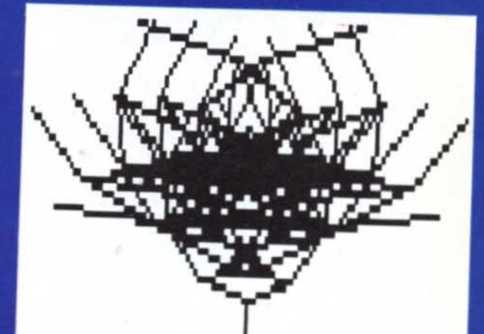
Gremlin (7,36,1.28,1,0.64,4) from D. Whithorn, Basingstoke.



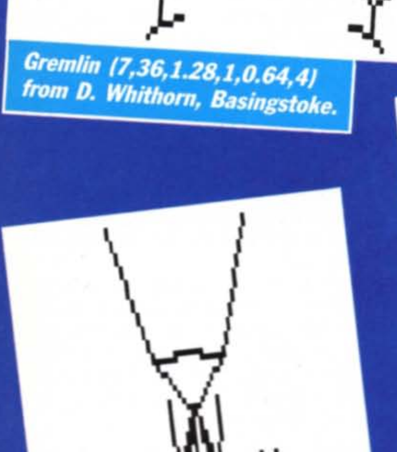
Spider (4,-16,-2.415,0.8,-0.48, 18) from A. Rambaut, Elgin.



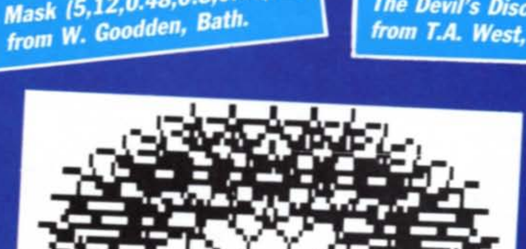
Mask (5,12,0.48,0.8,0.48,12) from W. Goodden, Bath.



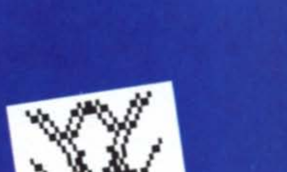
The Devil's Disciples (6,28,-0.92,0.9,1.34,-5) from T.A. West, Herne Bay.



Queen Tut (4,36,1.12,2,1.6,-6) from D.P.Dyer, Falmouth.



Seahog (8,16,0.48,0.9,0.16,0) from R. Davies, Islington.



Wildcat (5,0,0.8,1.2,0.64,6) from T. Schonfeld, Camberwell.

Tooling up for logon

Steve Gold puts comms theory into practice with his BBC Micro . . .

CONNECTING the RS423 port of your BBC Micro to the RS232 or serial port of a modem is just one step towards going online with your computer.

Assuming you've plugged your modem into the phone line and, if appropriate, your phone into the modem for dialling out, what next?

And the answer to that question is software. Without good applications software a computer is only as good as its operator and, assuming you don't care to write a complex machine code program for the task, good communications software is essential for efficient and trouble-free modem usage.

In addition, good communications (comms for short) software cuts the time spent online and ultimately leads to lower phone bills and, if appropriate, online service bills.

Before looking specifically at four communications packages for the BBC Micro I'll attempt to identify what I consider to be the most important features of a good BBC comms package.

Top of the list are print and spool to memory or disc functions. For those readers lucky enough to have access to a disc drive, spooling incoming data to disc cuts online time to a minimum and therefore pays off in the form of lower phone bills and so on. If you don't yet have a disc drive you should be especially careful when choosing your package to make sure it has a spool to memory function.

Because of the digital computer signals and the analogue nature of the telephone system, data transfer over the phone using modems is, at best, a tricky operation, and often subject to line noise.

This consists of the clicks, crackles and whirrs that often go unnoticed in a normal phone conversation. The merest click when transferring a Basic program over a phone line, however, can result in corruption. For a machine code program, the slightest byte out of place results in a un-runnable program.

To make life easier for modem users, error-checking routines following standard protocols are employed in some comms packages. Usually these conform to the Xmodem or Kermit standards. Xmodem, while far from perfect, is universally accepted among comms enthusiasts. Three of the four packages reviewed here employ error-checking.

For tape users, a rom is positively the best way to load in software. Whatever your BBC happens to be doing at the time, the ability to star a rom-based program into memory is a much better option than waiting ages for a tape to load.

For disc owners, as we shall see in a moment, the gap between rom and disc-based software is not as wide as between tape and rom. Disc-based software does hold certain advantages over roms in the quantity of program data that can be stored, but recent advances in rom paging techniques, as seen in the 128k romboard version of Mini Office II, have negated this advantage to a certain extent.

Online systems in the UK come in two general categories – viewdata and scrolling Ascii.

Viewdata format systems come with their data presented in paged format, each page consisting of a Mode 7 (teletext) screen of 40 columns by 22 lines of data. Usually only 20 lines of the screen are used for data, the remaining two lines being used for page details.

Viewdata format is perhaps best known in its Prestel application. Born in the late 1970s, Prestel currently has nearly 80,000 subscribers who can access the service for the price of a local call during non-office hours.

The service is similar to the Ceefax and Oracle pages transmitted over the TV carrier signals except, of course, since frames are accessed interactively, the number of frames accessible is virtually unlimited. In Prestel's case, the total number of frames available to users approaches 750,000.

Scrolling Ascii, on the other hand, is a much more flexible medium. While BBC Mode 7 is used for viewdata format systems, scrolling Ascii can be displayed in 80 column Mode 0 on the BBC Micro using suitable software.

When compared to Mode 7, Mode 0 is capable of displaying up to four times the amount of data on screen at any one time, but usually requires the use of a monitor. TV users and people wanting colourful displays will probably have to be content with Mode 6 or 7 displays.

To appeal to the widest possible readership of *The Micro User*, we've taken a detailed look at four packages, suitable for tape, disc and rom users.

EPROM

Commsoft comes in the form of a 16k eprom which plugs into the usual rom sockets on the BBC B, B Plus and Master. Subject to a few operating system variances, it works on all these machines.

Both viewdata and scrolling Ascii modes are supported, along with a variety of rates up to a maximum of 9600 baud. Offline viewdata and text editing facilities are included – a good plus in the program's favour. Another plus point is scored in the ability to cope with so-called script files, for automated logon to online systems.

Commsoft works with both tape and disc-based filing systems, although the well-written 52 page manual does point out that a disc-based system greatly extends the program's capabilities. A range of driver discs for intelligent modems is also available at modest cost.

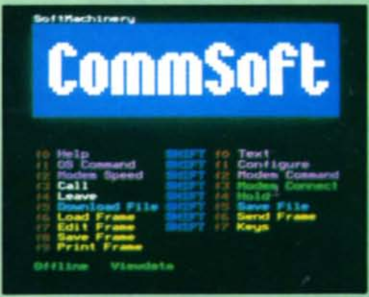
For beginners, the program has a context-sensitive help or aide-memoire facility, paged in from the BBC Micro's function keys.

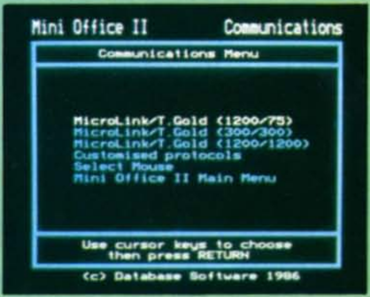
***Verdict**: A good all-rounder, suitable for beginner and serious comms enthusiast alike. Tape-based users may find the disc-user bias of the program a little restrictive, particularly if an intelligent modem needing a customised driver program is required.*

ROM BASED

Commstar is now in its second version, called Commstar II. This 16k rom-based program works to both viewdata and scrolling Ascii terminal emulations.

Unlike Commsoft, certain functions such as automated logon via script files are not supported. As compensation, the program does accept the saving and loading of function key strings en masse, thus reducing the number of keystrokes required to logon to an online system. In its new version the package includes many features not often seen


SoftMachinery
CommSoft
f0 Help
f1 OS Command
f2 Modem Speed
f3 Call
f4 Leave
f5 Download File
f6 Load Frame
f7 Edit Frame
f8 Save Frame
f9 Print Frame
SHIFT f0 Text
SHIFT f1 Configure
SHIFT f2 Modem Command
SHIFT f3 Modem Connect
SHIFT f4 Hold
SHIFT f5 Save File
SHIFT f6 Send Frame
SHIFT f7 Keys
Offline Viewdata


Mini Office II Communications
Communications Menu
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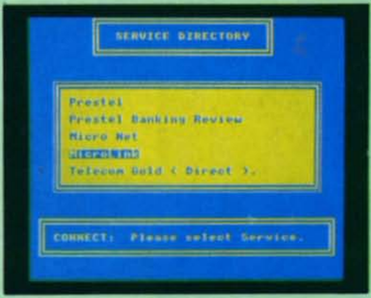
MicroLink/T.Gold (300/300)
MicroLink/T.Gold (1200/1200)
Customised protocols
Select Mouse
Mini Office II Main Menu

Use cursor keys to choose
then press RETURN

(c) Database Software 1986


SERVICE DIRECTORY
Prestel
Prestel Banking Review
Micro Net
MicroLink
Telecom Gold (Direct).

CONNECT: Please select Service.

on BBC Micro comms packages such as viewdata frame carousel and frame tagging. Such functions, while not entirely necessary for online sessions, do make life a lot easier.

***Verdict**: Like Commsoft, a good all-rounder. The manual is extremely well written for beginners. The only criticism which can be made is a surfeit of onscreen information (too many bells and whistles).*

SUITE

Mini Office II is the long-awaited successor to Mini Office, and comes on tape, disc and rom. It is suitable for all BBC Micros.

Unlike the other packages reviewed here, Mini Office II comes as part of an economically-priced suite of software, all of which is included in the price tag. This means that for the price of one of the above rom packages, you get a word processor, graphics and database program for free.

That having been said, Mini Office II lacks one thing the other three packages offer – a viewdata option. This means that, for Prestel use, a further package is required. Database does point out, however, that simple viewdata programs are available in the public domain – that is free software – on several bulletin boards.

In communications mode Mini Office II supports most baud rates and modems, and has full Ascii text upload and download functions. But error-checked file transfer such as Xmodem is not supported.

Again, such a shortcoming when viewed in communications terms is major, although taken in context with the value for money aspect of the program, becomes quite minor.

***Verdict**: Excellent value for money for beginners, but advanced users may miss error-checked file transfers and viewdata.*

DISC ONLY

PMS Dialup, the most expensive software reviewed here, is produced with both the beginner and advanced communications enthusiast in mind.

As you'd expect from a sophisticated product, Dialup supports both viewdata and scrolling Ascii formats, and can even cope with BT's Epad form of online error-correction.

Unlike the other three packages, it only comes in disc format and requires a disc filing system as standard. So for data uploads and downloads a second disc is necessary. For single disc drive users this can make for a lot of disc-swapping.

The program has a dongled lead to prevent program piracy. These are a good thing from a software producer's point of view, effectively preventing more than one computer using a package at a time. From a user's point of view they are highly restrictive and mitigate against adult usage of the program.

Software licensing today places a great degree of trust on the user. Dongles have their place in expensive business software, but including them on such a relatively low-priced piece of software could dissuade potential buyers.

Having said this, most users who buy Dialup will, I suspect, be pleasantly surprised to discover that the package has virtually every known communications bell and whistle function built in. These include automated logons via programmable script files, Xmodem, Kermit and proprietary error-checked file transfers, and a variety of functions designed to accommodate most, if not all, modems available today.

Dialup was first introduced to the educational markets in the middle of last year. After a successful trial marketing period, the program is now available for the business and home user market.

***Verdict**: Expensive but nice. The tie to disc-based systems along with dongled program protection may dissuade some potential purchasers.*

CONCLUSIONS

As with all types of application software, choosing communications software is a balance between good value for money and features required. For beginners, Mini Office II seems to be the best option, bearing in mind its other bundled functions if the world of computer communications begins to pall.

The lack of viewdata functions for the beginner is largely irrelevant as most free public access bulletin boards operate to scrolling Ascii format anyway.

For the more serious enthusiast the choice is less clear; price-wise there is little to choose between Commsoft and Commstar. And for the professional who uses just a couple of comms sources on a regular basis Dialup would be a good choice.

Commsoft rom from Softmachinery, 68 Botley Road, Oxford, OX2 OBU. £24-95.

Commstar Rom from Pace Micro Technology, Juniper View, Allerton Road, Bradford, BD15 7AG. £30.

Mini Office II from Database Software, 68 Chester Road, Hazel Grove, Stockport, Cheshire. Tape £14.95, 5.25in disc £16.95, Master 5.25in disc £19.95, Compact 3.5in disc £21.95, rom £59.95. The package also includes a word processor, database, spreadsheet, graphics, and label printer.

PMS Dialup on disc from Prism Management Services, Norfolk House, Smallbrook Queensway, Birmingham B5 4LJ. £89.95.

Amazing Acornsoft bargains

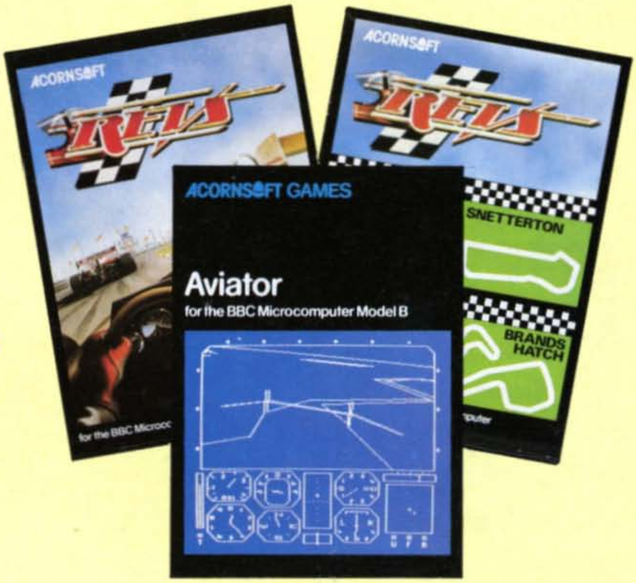
GAMES

THREE tapes for the price of ONE!

Revs and Aviator are two of the best simulations ever produced for the BBC Micro. And with Revs Four Tracks you will be able to experience the excitement of driving around some of Britain's most renowned racing circuits.

Games Galore
Normally £39.85
Offer Price £9.95

Save £30!


ACORNSOFT
REVS
ACORNSOFT
REVS
ACORNSOFT GAMES
Aviator
for the BBC Microcomputer Model B
SNETTERTON
BRANDS HATCH

LANGUAGES

Powerful roms pack a punch

- **BCPL is the most flexible of modern structured languages and is the easiest to learn. It is particulary good at handling Input and Output, and is perfect for writing utilities, screen editors, control systems – even games software. The package includes a language rom, a disc containing compiler, screen editor, 6502 Assembler, utilities – and a 450 page User Guide.**

BCPL Bundle
Normally £109.70
Offer Price £29.95

Save £80!

- **Forth is a complete implementation of the 1979 standard specification. It is a compiled language which typically runs five times faster that Basic, and this rom version gives full error messages, making it ideal for beginners and enthusiasts alike.**

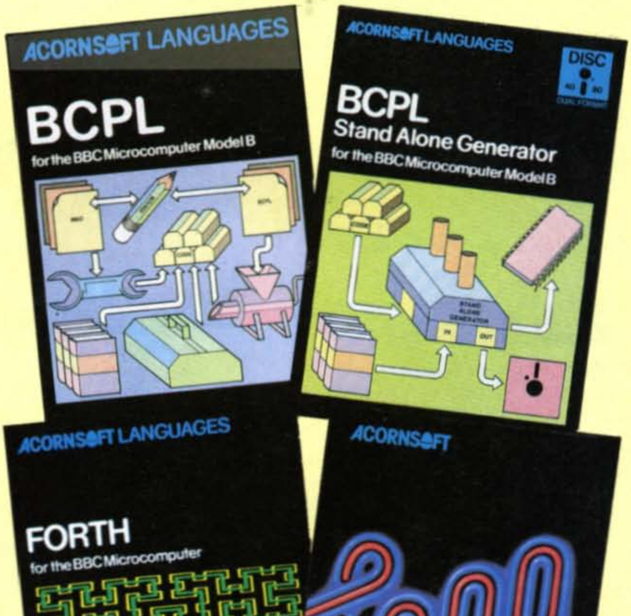
Normally £49.85
Offer Price £19.95

Save £30!

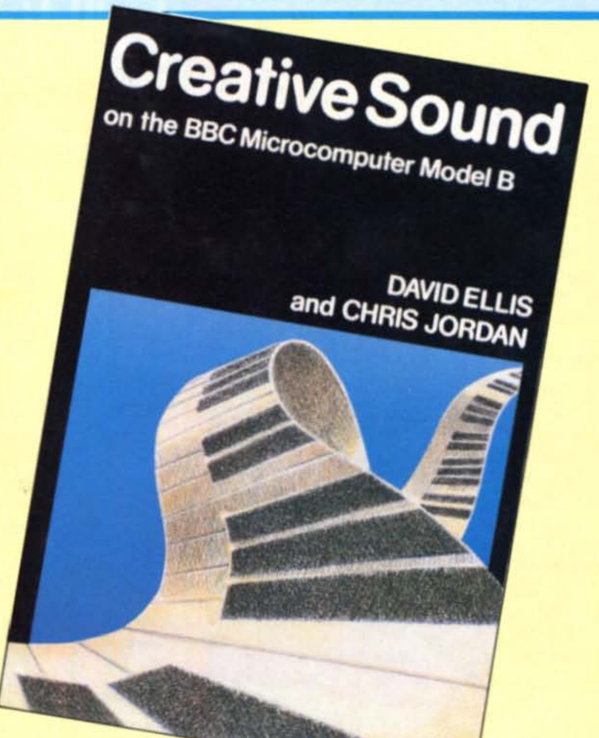
- **Acornsoft Logo is a full implementation of the Logo language widely used in schools. Special features include multiple screen turtles, extensive sound and graphics commands, and list processing facilities. The package includes two roms, three manuals, a reference card, one disc and a cassette.**

Normally £69.00
Special offer £29.95

Save £39!


ACORNSOFT LANGUAGES
BCPL
for the BBC Microcomputer Model B
ACORNSOFT LANGUAGES
DISC
BCPL
Stand Alone Generator
for the BBC Microcomputer Model B
ACORNSOFT LANGUAGES
FORTH
for the BBC Microcomputer
ACORNSOFT
Logo
A full implementation in two language ROMs for the BBC Microcomputer Model B

MUSIC


Creative Sound
on the BBC Microcomputer Model B
DAVID ELLIS
and CHRIS JORDAN

Make your micro sound sensational!

Creative Sound is a beautifully presented 320 page book, packed with everything you need to know about music on the BBC Micro.

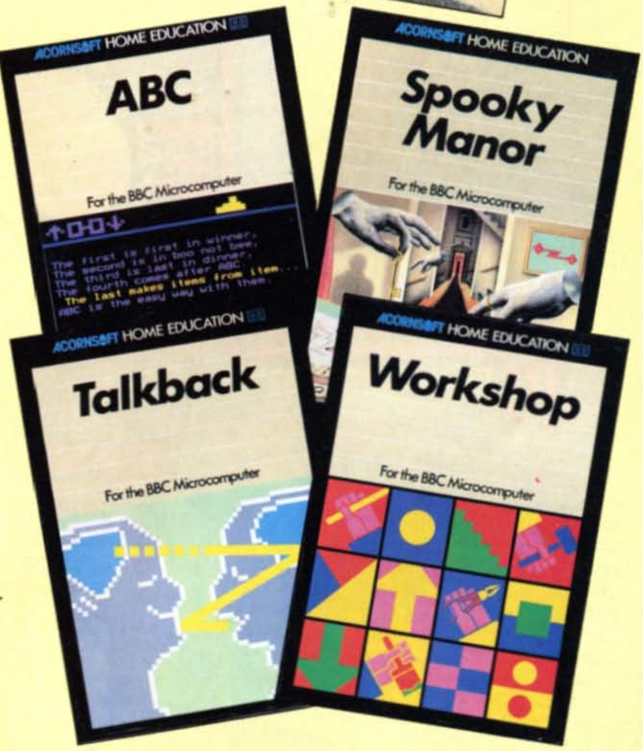
The authors are musician, composer and programmer David Ellis, and Chris Jordan, who designed the BBC Micro's sound system as well as the Acorn Music 500 and 5000.

There are more than 30 program listings, including programmable synthesisers, sequencer, music compiler, example tunes, Mozart's Musical Dice Game, composition aids, pitch trainer, scales program – and sound effects galore.

Creative Sound
Normally £9.95
Offer Price £4.95

Save £5!

EDUCATION


ACORNSOFT HOME EDUCATION
ABC
For the BBC Microcomputer
ACORNSOFT HOME EDUCATION
Spooky Manor
For the BBC Microcomputer
ACORNSOFT HOME EDUCATION
Talkback
For the BBC Microcomputer
ACORNSOFT HOME EDUCATION
Workshop
For the BBC Microcomputer

For the younger micro user . . .

- **ABC is a unique writing tool for seven year olds and upwards, designed to be easily operated and quickly understood.**
- **Spooky Manor is an adventure game for up to four players that encourages planning and logical thinking.**
- **In Talkback you can hold conversations with the computer by typing in sentences – and even create your own computer characters.**
- **Drill, cut, squash and paint your creations using the machines in the Workshop. Suitable for children from the age of three upwards.**

Previously each package cost £9.95 – now you can buy all four tapes together for the same price.

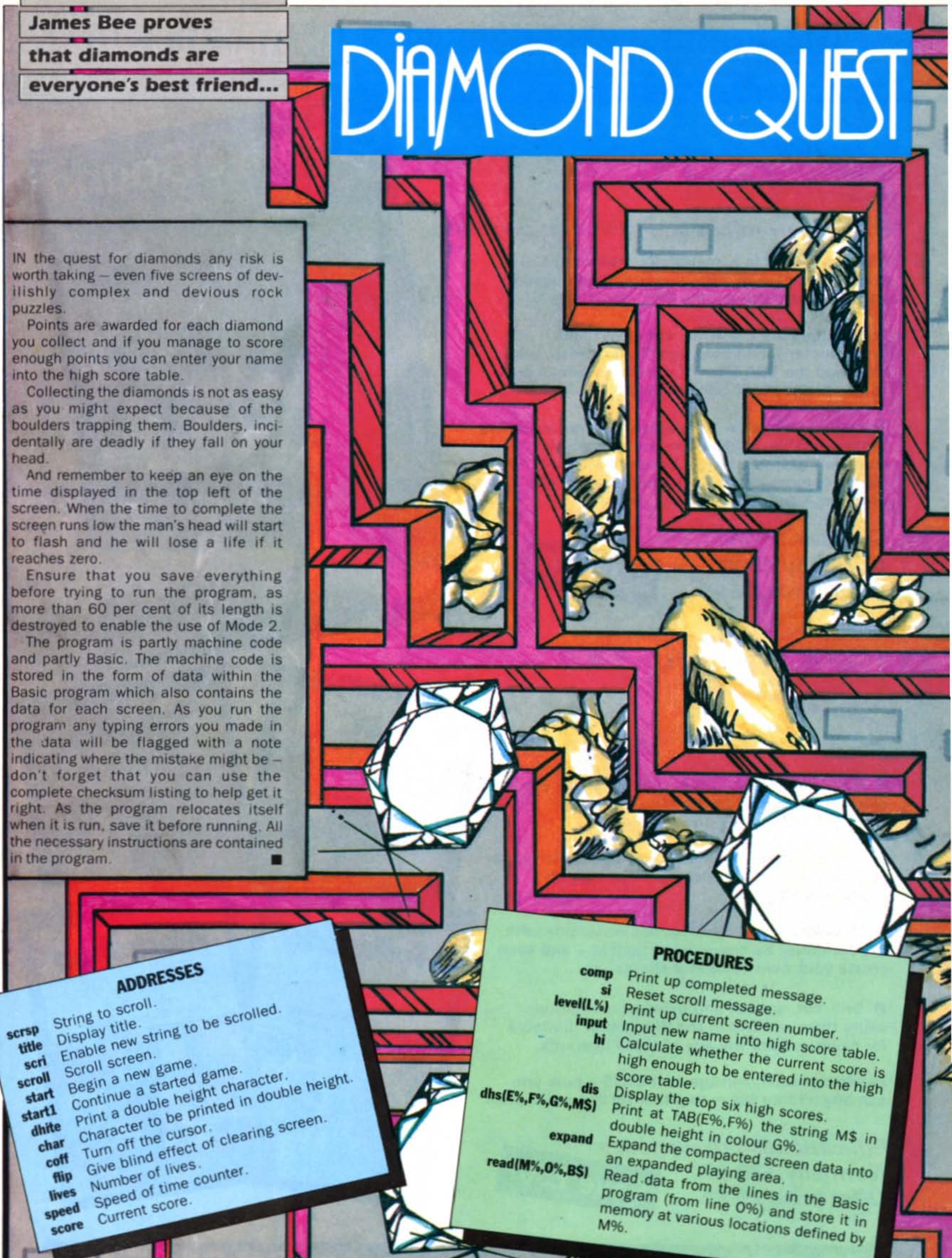
Educational extravaganza
Normally £39.80
Offer price £9.95

Save £30!

TO ORDER TURN TO THE FORM ON PAGE 151

James Bee proves
that diamonds are
everyone's best friend...

DIAMOND QUEST



IN the quest for diamonds any risk is worth taking – even five screens of devilishly complex and devious rock puzzles.

Points are awarded for each diamond you collect and if you manage to score enough points you can enter your name into the high score table.

Collecting the diamonds is not as easy as you might expect because of the boulders trapping them. Boulders, incidentally are deadly if they fall on your head.

And remember to keep an eye on the time displayed in the top left of the screen. When the time to complete the screen runs low the man's head will start to flash and he will lose a life if it reaches zero.

Ensure that you save everything before trying to run the program, as more than 60 per cent of its length is destroyed to enable the use of Mode 2.

The program is partly machine code and partly Basic. The machine code is stored in the form of data within the Basic program which also contains the data for each screen. As you run the program any typing errors you made in the data will be flagged with a note indicating where the mistake might be – don't forget that you can use the complete checksum listing to help get it right. As the program relocates itself when it is run, save it before running. All the necessary instructions are contained in the program. ■

ADDRESSES

scrsp	String to scroll.
title	Display title.
scri	Enable new string to be scrolled.
scroll	Scroll screen.
start	Begin a new game.
start1	Continue a started game.
dhite	Print a double height character.
char	Character to be printed in double height.
coff	Turn off the cursor.
flip	Give blind effect of clearing screen.
lives	Number of lives.
speed	Speed of time counter.
score	Current score.

PROCEDURES

comp	Print up completed message.
si	Reset scroll message.
level(L%)	Print up current screen number.
input	Input new name into high score table.
hi	Calculate whether the current score is high enough to be entered into the high score table.
dis	Display the top six high scores.
dhs(E%,F%,G%,M$)	Print at TAB(E%,F%) the string M$ in double height in colour G%.
expand	Expand the compacted screen data into an expanded playing area.
read(M%,O%,B$)	Read data from the lines in the Basic program (from line O%) and store it in memory at various locations defined by M%.

VARIABLES

A%	Memory location where compacted screen data is expanded to.
B%	Number of bytes expanded.
C%	Length of the data to be expanded for screen L% from L%().
D%	Memory location of compacted data for screen L% from A%().
E%	X position for double height print string.
F%	Y position for double height print string.
G%	Colour of the double height print string.
H%	Random location where extra time capsule stored.
I%	Loop count/time value.
J%	Loop count.
K%	Key press variable for input of new high score name.
L%	Current level.
M%	Memory location to store data.
N%	Number of bytes that one byte of compacted data should be expanded to.
O%	Data number to start reading data from.
P%	New position in high score table.
Q%	Number of data items to be read.
R%	Sum of data read.
S%	Score value.
T%	Checksum.
A$	String to scroll.
B$	Name of data block being read for error message.
C$	Word of data.
G$	Key press variable.
M$	String to be printed in double height.
N$	New high score name.
A%()	Memory address where screen data stored.
L%()	Lengths of compacted screen data.
S%()	Scores in high score table.
N$()	Names in high score table.

Turn to Page 141 ▶

MEGA BYTES
FOR MINI BUCKS
Viglen DRIVE 0
Viglen DRIVE 1

Picture shows 20 and 28 megabyte units. 40 and 56 megabyte units may be slightly taller in size.

Plug in 20 to 112 MBytes of extra storage with the Viglen Winchester System

If you want to increase your storage capacity up to an incredible 112 MBytes you need a Winchester; but not just any Winchester ... the new Viglen System is 100% compatible with the Acorn Winchester, it's simplicity itself to install and it costs a lot less than you think.

The Viglen Winchester is ready to plug straight into your BBC Master or if you have a B or B plus you will simply have to fit an ADFS ROM. You can use up to two floppy disk drives in conjunction with the unit and, fitted to the B+ or Master, the floppies can double their capacity by running in double density mode.

The 112 MBytes Viglen Winchester System is equivalent in capacity to over 1000 100K floppies or 250 400K floppy disks. It takes under 2.5 seconds to save 200K bytes, making it at least ten times faster than the equivalent floppy disk options. The system is designed for virtually every application from education or business to home use.

	PRICE INC V.A.T.
Drive 0 Single	
VB20 20M Winchester	649.95
VB28 28M Winchester	699.95
VB40 40M Winchester	1045.95
VB56 56M Winchester	1119.95
Drive 1 Second Drive	
VB120 20 M Drive 1 Winchester	549.95
VB128 28M Drive 1 Winchester	599.95
VB140 40M Drive 1 Winchester	819.95
VB156 56M Drive 1 Winchester	899.95
Acorn ADFS Rom with utilities (essential for BBC B and B Plus)	29.95
Acorn 1770 upgrade kit (BBC B)	49.95

WHAT DO I GET FOR MY MONEY

1. Winchester Unit – (winchester drive, controller boards, power supply and fan all fitted in one compact case). The fan is recommended in order to keep the winchester at the correct operating temperature.

2. Master Reference manual part 1 (for a BBC B or B plus you will require the Acorn ADFS Rom and utilities available at an extra cost).

3. Winchester user guide.

4. Additional utilities on the winchester including formatter, verifier, ADFS menu and backup program.

PLUG IN SECOND DRIVE

The Acorn ADFS can handle up to two winchester drives. These are accessed as drive 0 and 1 (the floppy disk drives being accessed as drives 4 and 5). Viglen winchesters are supplied as Drive 0 (single unit) and Drive 1 (Second drive for single unit). The Viglen drive 1 can be instantly plugged into drive 0 and used either as a backup for Drive 0 (and perhaps taken off and stored away) or for more online mass storage. This will enable you to back up 20 Megabytes in under 7 minutes.

STORAGE OPTIONS:-

Drive 0	Drive 1	Total Capacity
20 Meg	20 or 40 Meg	40 or 60 Meg
28 Meg	28 or 56 Meg	56 or 84 Meg
40 Meg	20 or 40 Meg	60 or 80 Meg
56 Meg	28 or 56 Meg	84 or 112 Meg

COMPATIBILITY!

Viglen winchesters are 100% compatible with the Acorn winchesters and the ADFS. Any program that will run on the Acorn winchester will also run on the Viglen winchester. The winchesters also run with the Acorn Master 512 board with DOS plus (CPM86 and MSDOS compatible operating system).

BACK OF UNIT

Viglen
POWER
MAINS IN

1 MHz IN: This socket is used to connect the micro to the winchester.

1 MHz OUT: This socket is used to connect any other device that is normally plugged into the 1 MHz bus on the micro.

DRIVE 1 DATA: This is a 20 way socket which is used to connect the data signals to a second winchester drive.

DRIVE 1 CONTROL: This is a 34 way socket which is used to connect the control signals to a second winchester drive.

HOW TO ORDER

Simply write off today to Viglen and remember to add £8.00 carriage, packing and insurance, and allow 7 days for delivery. Credit card holders may order by telephone. If you'd like to find out more why not come down to our West London showroom (see map for directions) or if you can't make it simply ask for our special datasheet.

Viglen

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Orders from Educational Establishments, Government Departments and Plc Companies accepted. Education discounts available, please call.

Prices correct at time of going to press and subject to availability

Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Quantum qualified

I NOTICED in the April edition of *The Micro User* that in response to Mr Peter Noble's letter, Mike Cook defined a quantum leap as the smallest quantity a system can possess. This in fact defines a quantum in accordance with the quantum theory. A quantum leap designates a major breakthrough or sudden advance, so Mr Noble did not misuse the word.

Please keep up the good work in your excellent magazine. – **Jerome Gudgeon, Paignton.**

● *Let's try to get the term sorted out. A quantum is the smallest possible quantity of anything, such as energy of electrons or steps in analogue to digital conversions.*

It is derived from the Latin meaning quantity, and my dictionary gives one of the meanings as "the smallest quantity that will suffice". As an example, it quotes "there is not a quantum of evidence for your accusation".

The word was first heard by the general public in the early seventies when there was a pop group called Quantum Jump. It sounded hi-tech and slick and became used in all sorts of cheap pulp science fiction.

Because people did not understand the meaning they invented their own, after all to the average person the word quantum sounded impressive.

The problem is that there isn't a hype sounding word to mean major breakthrough, the best science can do is to say "order of magnitude" which isn't as slick. Hence the word is in common use quite incorrectly, but you can't say you are suddenly going to redefine it.

Sound and vision

I HAVE for two years used my BBC Micro with a monochrome monitor but recently I bought a Philips CM8524 colour monitor. As it has a separate audio input I got the idea to send the sound signal to the monitor instead of the computer's loudspeaker.

This would be very practical because I can then easily control the sound intensity.

Could you please tell me how to send the sound from my micro to the monitor?

Also I have 16 roms, 32k shadow ram and run the disc drive on the computer's PSU. Is it too much for the PSU to drive, and if I should have an extra one, which would it be advisable to buy? – **Ivar Wind Skovgaard, Holbaek, Denmark.**

● *Most monitors have a very low impedance sound input with a 1 volt peak to peak signal level, so disconnect the loudspeaker wire and connect the computer to the monitor at that point.*

Make sure that the left hand prong goes to the signal and the right hand prong goes to the monitor earth.

I always recommend the use of a separate power supply for disc drives. There are a few good ones on the market, such as the one from Pace in Bradford.

Misfiring guns

RECENTLY I have found that shortly after a cold start anything white on the display turns magenta for about 30 seconds and then returns to normal. This does not recur during further use.

I have checked all the leads and so on, but all are okay. Could you offer any advice on the fault as in the area where I live and within my circle of friends no one has a clue. – **E. Bennett, Doncaster.**

● *Magenta is formed from the blue and red guns inside the monitor. What is missing therefore is the green gun.*

There can be two possible causes – either the computer is not generating the green gun signal or the signal is not getting to the monitor. The latter is more likely, and your problem is the lead or the sockets on the computer or monitor not making contact.

When the fault occurs try repeated plugging and unplugging of the lead at the monitor and computer while they are on to see if this cures it. You will probably need to have a new socket fitted by a dealer if this is your problem.

If the fault lies with the computer or monitor circuit you will need test equipment to tell where the green signal is failing.

Keyboard connections

I FIND that at frequent but irregular intervals my BBC B will not accept input from the keyboard. Sometimes it happens almost immediately after switch-on but at other times it doesn't happen for half an hour.

When it happens while I am word processing, I can press Break, without loss of text. It may then work satisfactorily for from 30 seconds to 30 minutes.

Even more frustrating is when it happens while my children are in the middle of typing in a program. In this case function cannot be restored without losing the program. – **J.W.C. Spencer, Peterborough.**

● *Most problems with the keyboard are down to the keyboard ribbon connector. This is an insulation displacement connector, and repeated removal and replacement can leave the connections intermittent.*

To see if this is your problem next time it jams up remove the lid, and while the computer is still on try waggling the cable. If it suddenly comes to life you have traced the fault. A new cable can be obtained from most dealers.

You ought to be able to recover the program by typing OLD, even after a Control+Break.

Sector writing

WHILE updating files on disc from within Viewstore or downloading telesoftware to disc using the ATS rom, a "Sector not found error" will intermittently occur.

Sure enough, the sector seems to have been written to where it should not, and the only remedy is to reformat the offending sector using a disc editor, with the consequent loss of data on that sector.

I realise that the drives are fairly old and probably have a slow access time, but the DIL switches inside the computer are set for slow access drives as standard. As a precaution against rom clashes I have removed all unnecessary roms but still the problem persists.

Can you provide any advice to solve this problem? – **R.M. Dowling, Sidcup.**

● *This sort of problem can sometimes be caused by each of your disc drives having a terminating resistor. This will cause unreliability of disc access. If not, check that IC79 and 80 are 7438 chips and not 74LS38s as the LS chips are not as good at driving lines as the other variety.*

Absolute accuracy

TO perform a facial deformity analysis we have a Master 128k turbo upgraded machine connected to a PLG graphics plotter.

We find that when the cursor is displayed on the screen it develops its own random motion. As a result if, for example, we repeatedly measure the same angle, it varies by two to three degrees.

The plotter has been checked and is performing correctly and the mains voltage supply is stable. We were advised by our supplier that this is an inherent fault in the BBC design.

Can you confirm this, and have you any further advice because many other users must be using BBC Micros for similar measuring tasks. – **G.R. Barker, University Dental Hospital of Manchester.**

● *The problem here is not one of design error in the BBC Micro or the plotter, but in the accuracy of the whole set up. As you know, any instrument will only give*

Turn to Page 24 ▶

Your technical questions answered by MIKE COOK

PROBLEM SOLVED

◀ From Page 23

meaningful results up to its absolute accuracy.

And I am sure you must have chastised your students for giving the result of an experiment to eight decimal places, because that's what the calculator said, when the accuracy of the measurements taken mean that many of the least significant digits are totally meaningless.

The same thing is happening here. The plotter is a pantograph type that works out Cartesian coordinates from the angles of two potentiometers.

The accuracy depends upon two factors: How accurately we can measure the potentiometers' resistance and their linearity. Both factors will prevent you from measuring angles to this sort of precision.

The analogue to digital converter in the BBC Micro will only measure to 1 part in 256 withcut averaging many readings, and then it will only measure to 1 part in 102. This would not be so bad, but the plotter does not cover the whole range of values as it sweeps the pointer over the surface.

To make matters worse, I would be surprised if the linearity of the plotter's potentiometers is greater than 2 per cent.

The only answer to your problem is likely to be expensive. Two options spring to mind. First you could use a digital X-Y plotter – you can get some types to report back the pen position. Secondly you could use a digitising tablet to report back a cursor position. With either of these you will not get much change out of £1000.

Dust collection

I HAVE had my BBC B for over five years now, but around last September I began to have problems with it. It started automatically moving on to the next line as though Return had been pressed, but the line that I had just typed was not entered.

Once it was so bad that I couldn't finish one line without it giving error messages.

My Challenger disc drive also seems to be affected because when I catalogue the ram disc I am confronted by a screenful of garbage and anything on the ram disc is lost.

Someone suggested that it could be dust collecting in the contacts of the keyboard connector cable, so I cleaned this and my problems were over. But just recently it has begun crashing again and I have tried fiddling with the keyboard connector cable but with no success. – **Peter Young, Washington, Tyne and Wear.**

● *The problem is almost certainly one of an intermittent contact – dust would prevent switches making contact. When you cleaned the system last time you disturbed the contact and made it good again.*

As information on the ram disc is being lost, I think there might be a crack or break in the power lines somewhere. Try crimping up the spade connectors coming from the power supply as they may have worked loose.

Switch kits

SINCE buying a Master I have to put up with the fact the DFS will not write to 40 track discs. The DFS on my BBC Micro double-stepped so a 40/80 switch was not necessary. I am now faced with problems of writing to 40 track discs to transfer files to other BBC Micros.

I have looked in *The Micro User* for people selling 40/80 switch kits without success (they only go with the drives). I am not experienced in hardware matters and I was wondering if you knew how to build one?

Could this be a good project for a body building slot? – **D. Dickens Stevenage, Herts.**

● *This sounds like an excellent idea for a Body Build article. So much so that it was published in the October 1985 edition of* The Micro User*!*

However it might interest you to know that from the sales point of view it was one of the least successful kits ever, and needless to say I have plenty left on my hands. They are priced at the original £32 for the kit or £37 assembled, and are available from Musbury Consultants.

The Master does have the command:

```
*DRIVE 0 40
```

but this does not allow you to write to disc.

Standard components

I HAVE made my own PCB and fitted all the standard components in the circuit for the A/D high speed converter from the February 1987 issue of *The Micro User*.

But I have had great difficulty in finding the required chip (AD7828) or its equivalent, even though I have looked in all the available component catalogues such as Maplins, RS, Farnell, STC, Cirkit and so on. Is it a policy of your magazine to use non-standard components?

In future issues of *The Micro User* could a manufacturer's name be included for any non-standard components to help people such as myself who enjoy building their own PCBs?

I have built some of your previous Body Build projects and have had a great deal of enjoyment from them. – **C.G. Johnston & R.J. Grant, Callington, Cornwall.**

● *I do try as far as possible to use standard components in my Body Build articles, but to restrict myself to only those devices that are available from retail sources would mean that many of my articles could not be written.*

Suppliers like RS and Farnell are not set up to sell one off to the general public, and in fact the chip you speak of is available in the Farnell catalogue. I did say in the article that the chip was made by Analogue Devices.

Miracle worker

I AM not familiar with assembly language on the BBC Micro, or any other machine for that matter, and also not too hot on the ins and outs of accessing the 8271 directly. Can you give me advice (or even a listing) on how to read IBM format discs? Knowing that you are capable of miracles on a BBC Micro, I wondered whether you could help.

Finally, a query regarding the Musbury Consultants price list for Body Building projects. How is the double or triple height logo produced? This letter was produced using View and Fontwise+ but it caters only for double width. If it is your own program, why haven't you put it in *The Micro User* yet, I ask myself. – **Chris Marshall, Billericay, Essex.**

● *While it has been said that I can work wonders, miracles are a little harder. The problem is that IBM discs use a double density format and the 8271 can only work with single density.*

In theory it is possible for a BBC Micro running a double density system to read an IBM disc as IBMs can be made to read the single density BBC format.

However the problem remains of what to do with the information once you have it. It will not be in a form that can be used directly by the BBC Micro and will need extensive editing.

All in all, with the possible exception of text files, it is probably not worth doing. However if anyone out there wants to have a go we will definitely consider publishing your results.

As to your second part, I am afraid you are not going to like the answer. Although a lot of text in The Micro User *originates on BBC Micros, the printing is done on a professional typesetting machine capable of many styles and sizes.*

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Special Offer Prices valid
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5¼ Micro Media Brand Discs

	10	20	30	50	100
SS/DD	6.99	13.10	18.70	29.50	55.80
DS/40T	8.50	16.00	22.75	35.90	67.60
DS/80T	9.99	18.70	26.35	41.05	76.35
DS/HD for PCAT	24.15	46.25	66.25	105.25	200.10

5¼ Reversible discs (Flippy's)

Have two write protect notches & index holes.
Suitable for single sided drives.

10.25	19.55	27.15	42.25	78.45

3½ Micro Media Brand

SS/DD	19.99	38.40	55.50	87.25	163.90
DS/DD	21.99	42.55	61.60	96.90	182.30

All discs supplied are with labels, 5¼" write protects, envelopes & hub rings.

Discs purchased direct from one major manufacturer. 100% certified error free – lifetime guarantee.

PRICES INCLUDE V.A.T.

5¼ Rainbow Discs come in five colours

	20	50	100	250	500
SS/DD	13.20	30.75	57.10	134.50	252.45
DS/40T	14.35	33.10	60.70	141.45	262.20
DS/80T	15.20	35.20	64.85	148.75	276.00

5¼ Unbranded Discs

SS/DD	9.65	22.45	41.40	97.10	181.13
DS/40T	10.95	25.00	45.55	105.25	193.20
DS/80T	11.85	26.73	49.55	116.45	216.20

3½ Unbranded Discs

	10	30	50	100	150
SS/DD	14.95	42.95	61.50	111.65	164.50
DS/DD	16.70	48.30	78.20	147.20	212.20

SUMMER SALE · SUMMER SALE · SUMMER SALE · SUMMER SALE · SUMMER SALE

Monitor Swivel Bases

Pan tilt revolves around 360 degrees 12.5 degrees tiltable up and down Adjustable by front mechanism.

55x280x260mm for 12" Monitors		55x355x320mm for 14" Monitors	
1	13.25	1	16.70
3+	12.60ea	3+	15.90ea
6+	11.95ea	6+	15.05ea

Adjustable Copy Holder

A4 adjustable desk clamping. Magnifying cursor line.
Paper thickness adjustment.
Paper height adjustable clip.

A4 Version 24.00
Holds up to 300g

Desk Top Version 13.69
Holds up to 1000g

A3 Version 42.45
Holds up to 1400g

Printer Stand

5mm perspex

80 Column Version
400 x 310 x 100mm
22.80

132 Column Version
600 x 310 x 100mm
28.60

Mobile Printer Stand

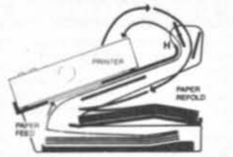
Rugged steel frame. Height adjustable basket for output paper & base shelf for input paper. Self assembly – includes castors.

80 column £50.00
132 column £65.00

The Space Saver

Paper feed and refold positioned one above the other. Dial controlled paper feed with adjustable deflectors ensures smooth flow and automatic refolding.

80 column 414x380x460mm		132 column 530x380x460mm	
1	34.40	1	43.00
3+	32.10ea	3+	40.70ea
6+	30.50ea	6+	38.65ea



Printer Ribbons

	3	6	12
Acorn AP80	7.25	13.80	25.55
AP100	7.40	14.15	26.20
Brother M1009	8.10	15.50	28.95
Colours	12.30	24.60	49.20
HR15 MS	10.70	20.70	39.35
Fabric	11.05	21.40	40.70
Canon PW1156/1080	7.95	15.20	28.30
Centronics GLP	8.10	15.50	28.95
Colours	12.30	24.60	49.20
Epson FX/MX/RX 80/85	7.25	13.80	25.55
Colours	13.20	26.40	52.80
LX/GX 80	6.90	13.10	24.15
Colours	12.60	25.20	50.40
MX/FX 105	8.80	16.90	31.75
LQ 800	10.00	19.30	36.60
Juki 6100 MS	7.25	13.80	25.55
5510	7.25	13.80	25.55
Colours	13.20	26.40	52.80
Kaga KP810/910	7.95	15.20	28.30
Colours	13.20	26.40	52.80
M/Tally MT80 MS	10.70	20.70	39.35
NEC PC8023	11.75	22.75	43.45
Colours	15.30	30.60	61.20
Panasonic KXP110/1080	10.70	20.70	39.35
Colours	19.35	38.70	77.40
Seikosha GP80	7.25	13.80	25.55
GP100	7.40	14.15	26.20
Shinwa CP80 MS	10.70	20.70	39.35
Star NL10	18.60	36.60	71.10

Colours available –
Red/Brown/Blue/Green & Yellow

If the ribbon you require is not listed please let us quote

The above is a small selection of the 250 different ribbons we stock. We shall be pleased to find your ribbon, however old or obscure.

MD 120

5¼" x 120
1 12.55
3+ 11.90 each
6+ 11.35 each

Wire Printer Stand

stacks print-out in document tray automatically. Suitable for most standard printers. Made of safety coated steel wire.
For 80 column £14.80
For 132 column £16.60

MD 50

5¼" x 50
1 7.80
3+ 7.40 each
6+ 7.10 each

MD 100

5¼" x 100
1 10.80
3+ 10.30 each
6+ 9.80 each

MM 40

3½" x 40
1 8.30
3+ 7.90 each
6+ 7.50 each

MM 80

3½" x 80
1 10.95
3+ 10.40 each
6+ 9.90 each

Computer Labels

Continuous fanfold, sprocket fed

	Price per 1,000	3,000
70x36	4.80	13.20
89x36	4.90	13.50
89x49	6.80	18.30
102x36	5.20	14.40

Please state no. of labels across the sheet (1, 2 or 3)

Computer paper

Plain fanfold, micro perf edges

Size	Weight gsm	1000s per box	Price per box 1 box	3 bxs +
11x9½	60	2	16.50	46.80
	80	2	20.40	56.10
Exact A4				
11⅔x9½	70	2	27.60	73.50
	90	1	17.40	43.80

A4 Fixed tractor paper available

ALL PRICES INCLUSIVE OF POSTAGE & PACKING AND V.A.T.

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Computer Supplies
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Potters Bar, Herts. EN6 3BR

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Out of Office Hours
0707 52698

Orders despatched 24 hrs.
Please allow 5 days for delivery.
For next day delivery, please ring for details. Postage covers U.K. only.

A **Catalogue** is available with a more comprehensive range of products including – 3M & Verbatim discs – a wider choice of paper labels, ribbons and accessories.
Ring or write to obtain your copy now!

Educational and HMG orders accepted. For official orders/invoice/credit orders there is a minimum order value of £15.00 excluding V.A.T. Any order under £15.00 will be subject to £3.00 handling charge.

Personal callers welcome
Weekdays 8.30am - 5.30pm
Saturdays 10.00am - 4.00pm

-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-

Solidisk Technology

SOLIDISK MASTE

If you want to upgrade your BBC B to a Master, why not use our MASTERPLAN? We buy in your Beeb and sell you a brand new MASTER: you pay only the difference.
Fill in the blanks below to help you cost the project:

Acorn Master 128K, brand new cost 499.00

BBC Model B, issue ...., trade-in worth
(issue 2 = £131, 3 = £191, 4 = £187, 7 = £225)
DFS, memory and other add-ons, trade-in
(We accept only Solidisk and Acorn add-ons. Reging for valuation)
Total cost of MASTERPLAN project

Masterising

If you are not yet ready to upgrade to a Master, why not Masterise? All you have to do is add Shadow Ram, Sideways Ram, the Real Time Clock and ADFS disk filing system — all available from Solidisk at good prices. You do not have to purchase them all of course, and they will not turn your Beeb into a Master (no numeric keypad or Rom slot, for example), but all the essential features are there and the solution could be well worth your while.

Real time Clock, Yes: £29, No: nil

1770-DDFS plus ADFS, Yes: £55, No: nil

DFDC plus ADFS, Yes: £60.00, No: nil

(Twomeg) 128K RAM, Yes: £60.00, No: nil
(other options include Twomeg 32, Twomeg 256, Fourmeg 32 and Fourmeg 256)
Total cost of MASTERISING project

Solidisk Real Time Clock:

The Real Time Clock and Calendar (RTC) can be plugged into any ROM socket on the Beeb with absolutely no other connection to make. It is powered by a rechargeable NICAD battery which should keep the RTC active throughout the Summer holidays.
Star commands include: Alarm, Bell, Boot, Configure, Dalarm, Noclock, Roms, RTC, Settime, Show, Status, Time and Unplug. FX161 and 162, Osword 14 and 15 are similar to the Master 128. It is also compatible with Basic 4's TIME$.
The RTC has many of the autoconfigure features of the MASTER with the same command syntax: Caps/Nocaps, data, delay, Fdrive, File, Ignore, Lang, Loud/Quiet, Mode (0-135), Boot/Noboot, Dir/Nodir, Time/Notime, Printer, Repeat, Rx, Scroll, Tube, Tv, Tx. If your Beeb has an AMX mouse, the RTC offers a DESKTOP and a CALCULATOR, just like GEM!

Order as RTC £29.00

Solidisk Dual Density Disc Systems:

Solidisk offers two types of disk filing system, with a choice of two Rom types. Both are based on the Western Digital WD1770 chip — the standard not only for the BBC model B, but also the BBC +, Master, Compact and ADFS. Both are fully compatible with Acorn Roms, offering complete solutions to the problems of updating the BBC, based on 1770, 8271, DFS and ADFS systems.
Not only is our range therefore unequalled, but also the features it offers; if you don't believe us, check other makes before you buy.

Which DFS?

WD-1770 DDFS Disk Interface:

If your Beeb has not yet been upgraded to disc, then the DDFS is the right choice. It is certainly the most popular version on the Beeb and easy to fit. Use with Acorn or Solidisk Roms to give compatibility with any 40/80 track drive, with or without PSU.

New low price without Rom £35.00
With STL 2.2 ROM (see below) £45.00
With STL 2.1 ROMs (see below) £55.00

BEEB Model B

WD-1770+8271 DFDC Disk Interface:

If you already have an 8271 based DFS from Acorn, Watford Electronics, Pace, Cumana or Viglen, this is the only way to add the WD-1770 to your system. Fully compatible with the Acorn DNFS1.20 ROM for the 8271 and Acorn ADFS for the 1770. Allows the Acorn chip set to self-erase, keeping memory requirements (and PAGE) at a minimum. For maximum performance, use the STL 2.2 Rom (for both 8271 and 1770). If ADFS is required, use Acorn DNFS1.20 ROM (for your 8271) with the STL 2.1 Romset (for the WD-1770). The last combination will still allow self erasure, and will add single and double density, cross format file copy, ADFS as well as NFS. In other words, everything imaginable with the Beeb.

New low cost DFDC without Rom £40.00
DFDC with STL 2.2 Rom £50.00
Special offers:
DFDC with STL ADFS 2.1 Romset (see below) £55.00
DFDC with STL 2.2 DFS and 2.1 (3 Roms) £63.00

1770
SOLIDISK dfdc
8271

Which ROMs from Solidisk?

STL DFS 2.2 ROM:

Runs with both 8271 and WD-1770 chips from Acorn, Watford and Opus, and 1770 from STL, and offers the following features:
★ 40/80 track software switching ★ unlimited catalogue entries ★ automatic Read after Write for media security ★ runs with Z80, 6502 and Econet ★ more commands than any other DFS including FORMAT in 40/80 track, VERIFY, DZAP, MZAP, RECOVER, RESTORE, WORD, RTRACK, WTRACK, DSTEP, ETC ★ when used with the WD-1770, reads disks in single and double density and IBM format ★ 60 per cent free extra storage space in double density (640K per disk compared with Acorn's 400K) ★ more speed and bigger file size.
Supplied on one 16K Rom with manual

Order as the DFSR2 .... £20.00

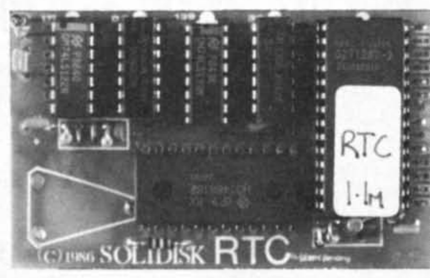
PLEASE SPECIFY WE/OPUS/MASTER/COMPACT as applicable.

The ADFS 2.1 ROMSET:

This double ROM set has all the commands of the STL DFS 2.2. Rom but runs ony with the 1770, not the 8271 system. It has many more besides, including all the commands in the Acorn ADFS Rom.
PLUS: ADFS disk formatter (for 40, 80 and 160 tracks) and VERIFY ★ MVADFS and MVDFS to transfer cross format disks between DFS and ADFS with automatic PAUSE for disk change when using a single drive ★ user specified (1 to 10) number of file channels to keep PAGE to a minimum ★ runs with the Z80, Turbo, 32016 and the new 80186 PC compatible upgrade.
Supplied on two 16K Roms or one 32K with two user manuals

Order as ADFSROM 2.1 .... £30.0C

PLEASE SPECIFY WE/OPUS/MASTER/COMPACT/16K OR 32K as applicable.



Real Time Clock

Solidisk FD35 3.5″ Disc Drive:

This is a superb 80 track, double sided, dual density drive, also useable on the ATARI ST. You get up to 640K maximum per disc (800K with the 80186) and at its price, you are guaranteed of extremely good value. Comes with demo disk.

Order as FD35, single drive £100.00
Order as TFD35, twin drive £200.00
Order as ADFS16 for the Compact £113.85
Separate PSU if required (PSU/35) £25.00
Recommended media:
Sony Double Sided, double density, 135 TPI or equivalent (£29 per box of 10).

Solidisk FD525 5.25″ Disc Drive:

This is a superb 80 track, double sided, dual density drive and very fast. You get up to 640K maximum per disc (800K with the 80186 board), 40/80 manual switch is optional as most Acorn DFS ROMs and Solidisk's have automatic 40/80 track software switch.

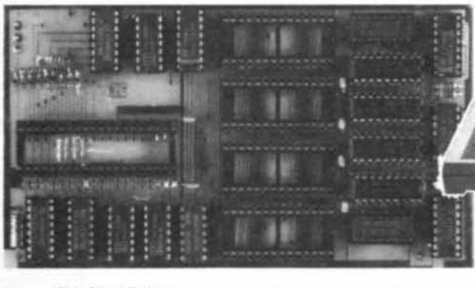
Order as DF525, single £119.00
Order as TFD525, twin in a bridge £228.00
Orders as TFD525/CPU, twin in the CPU case with detachable keyboard case for Beeb £239.00
Separate PSU if required (PSU/525) £25.00
40/80 track manual switch optional £2.00

PLEASE SPECIFY SWITCH/MASTER/COMPACT/ELECTRON if applicable.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

RISE YOUR BEEB!

Solidisk Technology



TWOMEG 128

New: The Twomeg 128K board

Solidisk has always been closest to emulate the MASTER 128K. The Twomeg 128K features 64K of Sideways RAM in four banks: 4, 5, 6 and 7, selected by a single latch at &FE30 for both read and write exactly like the Master. The remaining 64K is more versatile and can be used as four more Sideways RAM (12, 13, 14 and 15) or as Shadow RAM and a 24K printer buffer (good news for wordprocessor users).

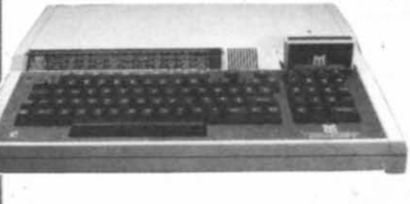
The new Twomeg 128K will run Computer Concepts Interword, Sheet and Spellmaster, Acorn View 3.1, Viewsheet, Viewstore, Basic etc.
A clever switch write-protects only the 8 banks of Sideways RAM without affecting the Shadow RAM and the Printer Buffer.
Ramdisk is not forgotten, you can have one in ADFS (if you have Solidisk ADFS) or in DFS for both 8271 and 1770 disc controllers.
Four extra ROM sockets are available directly on the Twomeg 128K board, numbered 8, 9, 10 and 11. Four ROM sockets on the Beeb are renumbered to 0, 1, 2 and 3.
Software is supplied on FIVE discs, containing Wordprocessor, Spelling Checker, Database, Macro Basic, Ramdisk, Menu, Manager etc. Software Pack 2 (five discs) is optional and contains many useful utilities for the machine code programmer. Software Pack 3 also optional, contains around 50 of Solidisk Megagames. List of all programs in these software packs is included in the Twomeg 128K User Manual. Fitting is extremely easy: just plug in the board into the CPU socket and push 3 terminals onto S20, S21 and S22. Internal logic produces chip select for the &FE30 latch. Free installation by local experts is available.
Order as 2MEG128 .... *£60.00*

PLEASE SPECIFY /40 TRACK OR /80 TRACK FOR THE SOFTWARE PACK 1, included in the price.
Optional software Pack 2 or 3 (five discs) *£10.00*

Detachable Keyboard and CPU case:

This 'three box' casing system will help you to organise your desk and improve comfort. The keyboard features the lowest profile (maximum height of any key is 47mm) and does not skid. Typing angle is 2-3 degrees better. The monitor sits on top of the computer. Pure metal construction provides EMF shielding against phantom keyboard interrupt and accelerates heat dissipation (no messy metal strengthening over plastic). Keyboard lead is 24" long.

Order as K/CPU case, special offer price while stocks last	*£25.00*
Note:	
Post and packing	*£6.00*



MASTER 128

The Fourmeg 32K board:

The Fourmeg 32 is a ROM expansion board on its own with up to 224K of installable firmware. It also is the FASTEST shadow RAM board around (it runs at 4 MHz while others run at 2 MHz, including the MASTER), and the fastest Sideways RAM board. It consumes also less power than any other ROM RAM board through the extensive use of CMOS devices.
The top row of five ROM sockets will take software ROMs, up to 32K each, such as used on the Beeb Plus, the MASTER or the Compact. They are high speed sockets.
The middle row contains 40K of high speed CMOS static RAM chips, acting as a Shadow RAM and a printer buffer or as two banks of Sideways RAM. Write-protection of Sideways RAM is performed by separate Read and Write registers with automatic write-protect when one presses the BREAK key.
The CPU is a 4 MHz, CMOS technology, GTE 65C02, similar to the one on the Turbo board, replacing the existing 6502.
The Fourmeg 32K is also upgradable, once more by the latest CMOS technology: 62256, 32k RAM on a single chip which plugs into one of the high speed ROM sockets.

This board is designed such that one can have everything required on a single, compact and easy to install unit. All the necessary software is in a MANAGER ROM (supplied). Star commands include: Shadow, Ramdisk, Ramoff, Ramdfs, Ramadfs, Ramdrive, Testram, Plus. A complete toolkit to assist programming in Basic is also included: Hardbreak, Join, Keyload, Keysave, Kill, Lvar, Menu, Msearch, Mzap, Page, Printer, Rcat, Number, Report, Rload, Rwipe, Salvage, Status, Sound. One year guarantee.

Order as FOURMEG 32	*£70.00*
Additional 32K chip (optional)	*£15.00*
Software packs 1 to 3 (optional), each of five disc	*£10.00*

The Fourmeg 256K board:

The Solidisk Fourmeg 256 board combines high CPU speed (4MHz GTE 65C02) with large memor size (256K Dynamic RAM, 8K static RAM) and powerful supporting software (32K MANAGER ROM). It offers four ROM sockets featuring high speed and high capacity (up to 64K ROM per socket), 8 shadow RAM banks, 8 Sideways RAM banks or even both.
Order as Fourmeg 256K *£135.00*
NOTE: NO MORE ROM BOARD TRADE-IN IS ALLOWED AFTER 1ST MAY 87.

Wordwise Plus or Interword Special Deal:

If you buy Wordwise Plus or Interword together with a Twomeg or a Fourmeg board, you get extra special discount!

Wordwise Plus (bundle only)	*£30.00*
Interword (bundle only)	*£50.00*

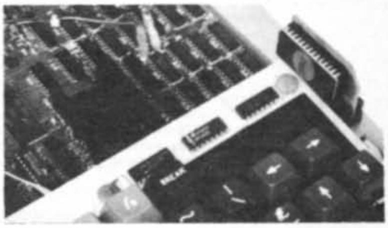
Special Offers on Sideways RAM boards:

These exceedingly popular systems (40,000 plus units sold) enables the Beeb users to load ROM images into the Beeb, make a 16K printer buffer, use DFS with PAGE at &E00, play Solidisk Megagames, bigger Basic (Vstore), store music and inumerable other uses as supported by a library of 15 software diskettes.
They consist of a base unit plugging into the rightmost ROM socket on the Beeb and an exchangeable RAM card with capacity ranging from 32K (two Sideways RAM banks) to 128K (8 Sideways RAM banks). They are now made available to you at less than half their normal price, all offering extremely good value. One year guarantee, supplied with User Manual and one software disc.

SWR32, 32K RAM, disc No 1	*£20.00*
SWR64, 64K ROM and two 16/32K ROM sockets, Disc NoI	*£30.00*
96K Extension for SWR 32	*£25.00*
SWR128 (new style), 128K RAM, two 16/32 ROM sockets	*£45.00*
Software Packs 1 to 3, each of five discs, any pack	*£10.00*
Any disc volume 1 to 15 each	*£2.00*

PLEASE SPECIFY /40 TRACK OR /80 TRACK as applicable.

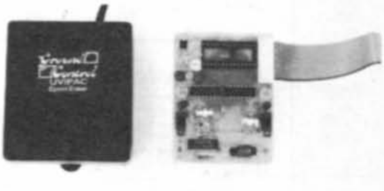
Electron Disc Interface:	*£50.00*
BABT approved Modem plus Linemaster ROM	*£30.00*



EPROM Programmer:

The UVIPROM is the cheapest Eprom programmer on the market yet the easiest to use, will program 2764 EPROMS in one minute and 27128 in two minutes.
A different version called the UVIPROM32 will program 27256 EPROMS in 4 minutes.
The MULTIPROM is the Deluxe version, combining the capacity of the UVIPROM and the UVIPROM32 and some other features. Use it to program 2764, 27128 (normal and A type), 27256 (12.5V and 21V), 27512, 27513 etc. Textool 28 pin ZIP socket fitted as standard.

UVIPROM plus disc No 10	*£20.00*
UVIPROM32 plus disc No 10	*£20.00*
MULTIPROM plus disc No 10	*£44.50*
UVIPAC Eprom Eraser	*£20.00*
2764 EPROM each £2.00, ten for	*£16.00*
27128 EPROM each £4.00, ten for	*£34.00*
27256 EPROM each £7.00, ten for	*£63.00*
Panasonic KX-P1081 Special Offer:	*£149.00 + VAT*



IMPORTANT NOTICE: TRADE-UP

Solidisk will accept return of memory boards up to ONE YEAR old for TRADING-UP. The selling price (below) is the price we sell the same goods at the time of the trade-up transaction.

Age	**Trade-up allowance**
Up to 3 months	90% of selling price
Up to 6 months	85% of selling price
Up to 9 months	80% of selling price
Up to 12 months	75% of selling price

If the balance of the upgrade is less than £15, a minimum charge of 15 is made.

****
As a result of our MASTERPLAN, we have a number of BBC Model B's for sale every day. All are fully inspected, reconditioned if necessary, and guaranteed. All have a new DDFS fitted as standard. We also buy second-hand Beeb for cash. See our price list for details.
****

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (16 lines).

NEW BRANCH IN BRISTOL OFFICIAL DEALER IN AVON

System One

System One: COMPACT now with 5.25" drives:

The System One consists of a Master Compact 128K, twin disc drives, optional monochrome or colour monitor, optional printer. Solidisk will give you free our own CDFS 2.1 ROM, a Dual Density Beeb Disc Filing System featuring disc sector editor (for both DFS and ADFS discs), MVDFS and MVADFS for cross format file transfer, disc formatter and verifier etc. Some of the options include 5.25" drive(s) which we believe is a better choice than the 3.5" format. The 5.25" format is still preferred for the Master 128 (even now, with 80186 board) and on the Beeb. Cheap discs, better reliability, better software availability are some of the key advantages. Don't buy single drive systems because you can't make copy ADFS discs with a single drive.

Available options (all prices include VAT):

A — Compact 128K with Acorn 14" Colour monitor, CDFS, twin 3.5" drive, one demo disc containing Solidisk Database, Spelling Checker and Megagames (as illustrated): *£749.00*
B — as above but with one 3.5" drive and one 3.5" drive and one 5.25" drive: *£748.00*
C — as above but with twin 5.25" drives in a bridge unit: *£759.00*

Monochrome Option:

All systems above (A, B or C) can be supplied with Acorn 12" monochrome monitor in place of the Colour monitor:-

A	*£598.00*
B	*£597.00*
C	*£608.00*

P-1081 Printer option: £171.45

Buy the Panasonic KX.P1081 NLQ/Super NLQ printer with a System One. At £171.45, you just can't afford to let this latest Japanese printer go. Special reduced price at only .... *£149.00 + VAT.*

SPECIFICATIONS

Print Method	Impact Dot Matrix
Print Speed (cps)	Draft 120 NLQ 24 Compressed 102
Print Mode Selector	Standard/Program, Near-letter quality, Compressed
Print Direction	Bi-directional with logic seeking (Uni-directional in bit image mode)
Print Head	9 pin
Print Head Life	100 million characters
Line Spacing	1/6", 1/8", 7/72", n/72", n/216" (programmable)
Line Feed Speed	100 ms (per 1/6")
Character Set	Full 96 ASCII characters with descenders, Italic, 32 international characters (11 Countries), IBM* special characters, IBM block graphics
Character Structure Draft NLQ Block graphics	HOR VERT 9 × 9 18 × 18 6 × 12
Bit Images (Dots/inch)	60, 72, 80, 90, 120, 240 (120 can be used in standard or double speed)
Paper Feed	Adjustable rear tractor feed and friction feed
Paper Width	Fanfold paper: 3" to 10" Single sheet: 4" to 9"
Number of Copies	3 (Original plus 2 non-carbon copies)
Interfaces Standard Optional	 8 bit parallel RS-232C (DTR, X-ON/X-OFF or ETX/ACK—KX-P11D; DTR, X-ON/X-OFF—KX-P17)
Buffer Standard Optional	 1 K text buffer 4 K text buffer (KX-P12)
Compatibility	RX-80™, IBM Matrix and Graphics Printers (Elite Pitch command of the Proprinter is also available.)
Noise Level	60 dbA
Reliability	MTBF 4000 hours at 25% duty (not including head life)
Environmental Conditions (Controlled)	Operating: 41°F to 104°F (5°C to 40°C)/20 to 80% humidity Storage: -4°F to 140°F (-20°C to 60°C)/10 to 90% humidity
Power Requirement	240 V AC ±10% 50 Hz 0.6 AMP
Dimensions (W×D×H)	15.9" (403 mm)×11.3" (286 mm)×4.5" (115 mm)
Weight	13.4 lbs. (6.1 kg)
Other Options	Color ribbons: Brown (KX-P111), Blue (KX-P112), Red (KX-P113)

Printing Sizes:

	Characters per inch				Characters per line			
	Pica	Elite	Semi-Comp	Comp	Pica	Elite	Semi-Comp	Comp
Draft/NLQ	10	12	15	17.1	80	96	120	137
Double width	5	6	7.5	8.5	40	48	60	68
Proportional Spacing	Variable				Variable			

*RX-80 is a trademark of Epson America, Inc.
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System Two

System Two: MASTER 128K with Twin 5.25" Drives in a Bridge Unit:

This system is our most popular, consisting of a fully blown MASTER 128K, twin 80 track, double sided 1.3 Megabyte Disc Drives in a bridge unit doubling as a monitor stand, free demo disc containing Solidisk Database, Spelling Checker and Megagames.

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A — As illustrated (without monitor) *£670.00*
B — with Philips 14" CM 8533 colour monitor (same construction as Acorn colour monitor) *£865.00*
C — with Mitsubishi 14" XC 1404 colour monitor *£830.00*

Special offers (if bought together with a System Two):

MP-165	*£220.00*
P-1081	*£171.45*
Master 80186, 512K Co-processor	*£223.00*
Acorn 20 MB Winchester	*POA*
Solidisk 20 MB Winchester (special issue, only with 80186 option)	*£500.00*

MP-165 Printer option: £220.00

The MP 165 is one of our best selling printers, featuring 165 cps in draft mode, 40-50 cps in NLQ, Epson FX compatibility, friction and tractor feed etc. Normal price is extremely attractive at £260.00 when you consider that the MP 165 is a lot faster than its rivals such as the Star NL-10, the Kaga KP-810, the EPSON LX86 or FX 85 etc. We will cut £40 off the normal price and give you a free printer lead if you buy the MP-165 together with a System.

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AMB15	Master 128	499.00
ADB12	Master ET	399.00
ADC06	Turbo Upgrade	125
ADC08	80126/512K	228.00
ADF13	Eprom cartridge	14.95

MANUALS AND DOCUMENTATION:

ADJ22	Ref manual Pt 1	14.95
ADJ23	Ref manual Pt 2	14.95

MASTER COMPACT SERIES:

ADB20	Master Compact Single drive	441.25
ADB20+ADF30	Master Compact S/D with TV mod.	457.35
ADB20+ADF31	Master Compact S/D with Mono monitor	537.85
ADB20+ADF32	Master Compact S/D with Colour monitor	687.35
ADF15	RS232 kit	29.90
ADF16	Second 3.5" floppy drive	113.85
ADF17	PAL TV Adaptor	29.90

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LMS	communication ROM for the Master	10.00
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EXTRA DISCOUNT

If you buy a disc drive or a printer or a monitor at the same time you buy a Master or a Compact, you are qualified for SYSTEM DISCOUNT and a free Software Pack 1 (worth £10.00 or more).

Normal Package Price	System Discount	Reduction
£600-£699	3%	£18-£21
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£800-£899	5%	£40-£45
£900-£999	6%	£54-£60
£1000 and above	7%	£70-£££

Example of system		normal price	Discount	Net price
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2	Compact Colour + Juki 6100	1027.35	71.89	**955.11**
3	Master 128 + twin F/Drives	729.00	29.16	**699.84**
4	Master 128, twin F/Drives, CM8533 Colour monitor	1028.00	71.96	**956.04**
5	example 4 + MP165 printer	1288.00	90.15	**1197-84**
6	Master 512 + twin F/Drives	957.00	57.42	**899.58**
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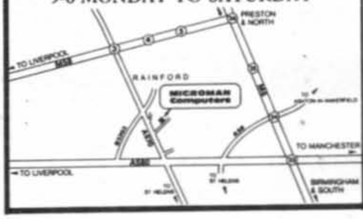

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Brian Clough's Football Fortunes

★ ★ ★ ★

ONE of the best things about Football Fortunes is that you don't even have to like or understand football to enjoy it. It helps of course, but if you enjoy Monopoly, then you should get a kick out of this one.

It is in no way an arcade type of simulation, but a computer interactive board game on the theme of soccer management, aiming for success on the field and in the bank.

The pack includes the program disc, a well designed if rather flimsy board, player cards, bank notes, counters and clearly laid out instructions.

Football Fortunes is for two to five players, although one person can play quite acceptably, controlling two teams.

Each player types in his name and chooses a team to manage. There is a choice of 10 first division sides, but any other team can be nominated, even an amateur or school side.

The computer then allocates 11 player cards and two substitutes to each team, each having a nominal value of between one and five points.

The team is divided into attack and defence, both sections having a strength determined by their total player values. These values will directly affect the results of matches.

Players "throw" the computer die and move accordingly. There are possibilities for player auctions, increasing attack and defence ratings, selection problems, sponsorship, manager's luck – good and bad – loans, transfers, injuries, wage demands and so on.

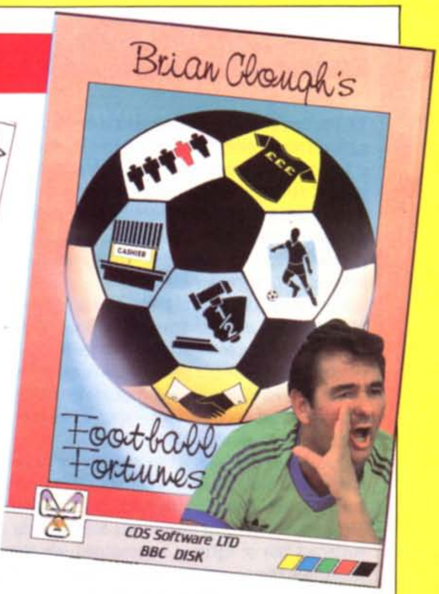
GOAL
PLAYER
MIDFIELDER

The team strengths are reassessed and entered into the computer, which determines the match results. These then come through on the teleprinter, the gate money is allocated and the league table formulated.

Matches are generally decided by team strength, but there can be upsets. As managers often say on the box: "There's nothing certain in football".

There are nine matches to the season and tension is certainly generated as it progresses. There is also the FA Cup to play for and, in subsequent seasons, European competitions.

Points are allocated according to your team's position in the league, its progress through the cup competitions and money held. The winner naturally enough is the player with the most game points at the end of an agreed number of seasons.



CDS has come up with a great game and presented it really well. It couldn't work as well purely as a board game, and it would lose something for being a micro-only game.

The balance achieved is just right, making for a great family game – and no crowd trouble.

Niels Reynolds

Price: £14.95 (cassette) £17.95 (disc). Supplier: CDS Software, CDS House, Beckett Road, Doncaster DN2 4AD. Tel: 0302 21134

Paperboy

★ ★ ★

PAPERBOY is a conversion of the arcade game of the same name. As the new local paperboy, you must deliver your wares to all the regular customers, while at the same time creating as much damage as possible to the homes of non-customers.

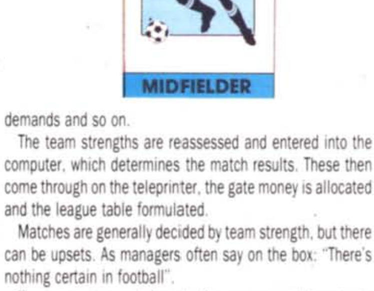
The title screen – a highly detailed front page of a newspaper, embellished with several different typefaces – promises a graphical feast.

Press the spacebar to begin the game and you are faced with a two-colour, high-resolution stick man. This may prove a disappointment to people expecting graphics of a similar standard to those of the arcade game.

The controls consist of left/right, accelerate/brake, turbo speed and throw. As play begins you are pedalling at full speed, which isn't particularly breathtaking. The only way to go faster is to press the accelerate and turbo keys simultaneously. After a short delay you will experience a startling increase in speed.

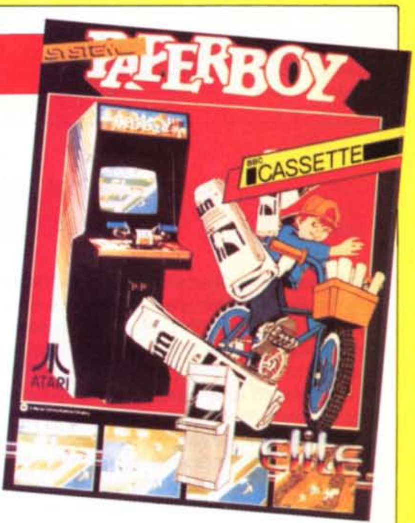
Cycling up the street you must throw a newspaper into mailboxes positioned outside some of the houses. Those without mailboxes are fair game for vandalism, so smash as many windows as possible while riding past.

Each dirty deed is totted up as a bonus score and awarded at the end of the round. Be careful not to damage a customer's property though, or you'll lose every bonus point you've accrued.



So keen is your employer to improve your cycling skills he has constructed a BMX park, so at the end of each day's work you go to the park and race against the clock for more bonus points. When attempting a jump be sure to activate the turbo as soon as you are lined up with the ramp, or you'll never make it.

Life is not as simple as it at first appears, because footpaths and roads are alive with obstacles. You can easily come to grief by hitting dogs, balls, workmen, radio-controlled cars, drunks and Sinclair C5s.



One annoying feature about losing a life is the fact that you are returned to the screen in turbo mode and the brakes don't appear to work. It is not unusual to hit a second object before you have regained control of the bike.

If you're looking for a BBC version of Paperboy then be my guest, but please ask to see a demo before you part with your cash.

Steve Brook

Price: £9.95 (cassette) £14.95 (disc). Supplier: Elite Systems, Anchor House, Anchor Road, Aldridge, Walsall WS9 8PW. Tel: 0922 55852

★★★★★ Excellent
★★★★ Worth buying
★★★ Only average
★★ Could do better
★ Give it a miss

The Lost Crystal

★ ★ ★ ★ ★

THE Lost Crystal has been over two years in the making and supposed release dates have come and gone like managers of Aston Villa. However the wait was definitely worth it – this is one of the best adventures I have ever seen.

It is offered in a superlative manner, with two cassettes, packaged with help and instruction booklets in a scintillating presentation box. The screen shots on the insert give an indication of the graphics ahead.

Indeed, though I am no fan of graphic adventures, I have to admit that these far surpass those in other classics such as Twin Kingdom Valley or the disc version of The Hobbit. The problem of having to toggle between graphics and text, evident in those adventures, has been overcome by some marvellous redefined multiple-tasking – which allows both to appear on the screen at the same time.

The documentation helps set the scene for the magnum opus which follows. "The Rainbow Crystal which has protected the people of Zaloria for many years," (from the hideous Bogle and his marauding Morgs), "has been struck by a mysterious bolt of lightning and shattered into seven pieces." You have been chosen as the hero whose task is to recover the fragments, find a way to recreate the Rainbow Crystal and restore peace to the Freelands.

The adventure boasts over 400 graphically illustrated locations, achieved thanks to a four-part loading system which in no way spoils the continuity of the game. Full instructions on loading are included in the Instruction booklet.

You begin this massive jaunt standing to the south of a large windmill. An exploration of this and its storehouse should enable you to solve these early puzzles which are really just beginners' fare, though you may get a shock when the milkman knocks for his money. Don't forget that Milk has gotta a lotta bottle!

In part two the going gets tough – and I resorted on at least one occasion to the excellent Help book. Careful progress through the many twisty passages – don't worry, it isn't a maze – and assistance from the strong but cowardly Miller should help you overcome these hurdles, but don't waste that coin! The Bogle is soon encountered and the poor Miller must be sacrificed to save your own skin. Who said Epic was heathen!

The third part is the largest and most difficult, and involves cunning manipulation of objects, some excellent chaining puzzles and the start of your collection of lost crystals. You will now discover the use for that sail pole which you have been carrying since the beginning of the game.

A secret passage will reveal a Priestess who is really a trading post for some of the possessions you are carrying.

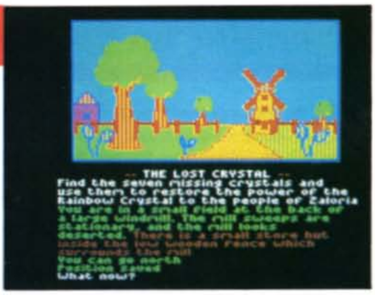
In part four, you become involved in a titanic struggle to rescue Merlin and must defeat the hydra, a dragon and a vampire before being reunited with an old acquaintance. The end is both spectacular and amusing.

My only criticism of the game is that the colours are sometimes a little garish,. But if (like me) you can do without them, the simple command GROFF will revert the game to a text-only format.

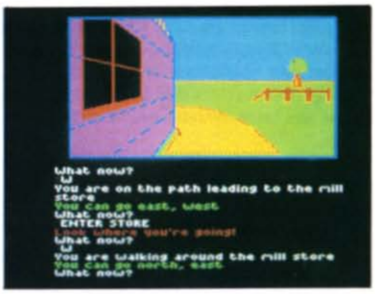
The puzzles are, on the whole, logical and typical of the Epic style of construction, present in say Wheel of Fortune or The Holy Grail.

The humour abounds and is pleasantly refreshing. I loved the references to Merlin and myself, Pendragon – just try typing HELP, for example!

The most important character in the game – besides yourself – is the Miller who demands sympathy and affection. I adored his vernacular comments at various stages of the game, and his muscular help is required on more than one occasion.



```
     -- THE LOST CRYSTAL --
Find the seven missing crystals and
use them to restore the power of the
Rainbow Crystal to the people of Zaloria
You are in a small field at the back of
a large windmill. The mill sweeps are
stationary, and the mill looks
deserted. There is a small store hut
inside the low wooden fence which
surrounds the mill
You can go north
Position saved
What now?
```



```
What now?
 W
You are on the path leading to the mill
store
You can go east, west
What now?
 ENTER STORE
Look where you're going!
What now?
 W
You are walking around the mill store
You can go north, east
What now?
```

This is a rare adventure which has a lot to offer to beginner and expert alike. It is not, perhaps, in the same genre as Robico or Level 9 releases but is a whole new experience which must be savoured.

With well over 100 text adventures on my shelf and the task of evaluating new releases almost every week, it can be easy to fall into the trap of complacency or smug indifference. However, when adventures such as The Lost Crystal come my way they banish any such feeling and put me firmly in my place.

This was an adventure I simply could not ignore, and must whole-heartedly recommend.

Pendragon

Price: £9.95 (mail order only). Supplier: Epic Software, 10 Gladstone Street, Kibworth Beauchamp, Leicester, LE8 OHL.

The Ket Trilogy

★ ★ ★

THIS package contains Mountains of Ket, Temple of Vran and The Final Mission, the three adventures forming "the classic and colossal Ket Trilogy." Often when a piece of software is given enough sales hype to sell sand to the Saudis you become a bit sceptical about the quality of the game itself.

The adventure is hardly "colossal". The Mountains of Ket has only about 66 locations, and the complete trilogy has no more rooms than an average Epic or Robico release.

But to its credit, the game encompasses three tightly-linked Sphinx/Ring of Time type adventures which contain some excellent chaining puzzles and devious passwords.

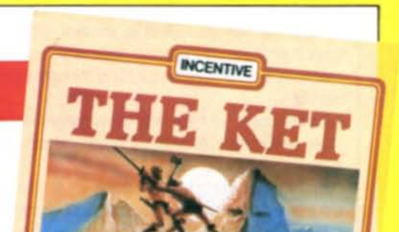
However, where things begin to break down is in the Dungeons and Dragons style combats which seem to occur at every sixth location. These combats are supposedly based on you and your foes' Prowess, Energy and Luck factors, yet are nothing more than a rather tedious series of random number generations.

Conflict can be avoided in some instances by trading wares instead or, in the case of the Ogre, by a spot of illicit gambling. But your whole progress can be ruined by unaccounted probability.

The room descriptions are sparse and little atmosphere is created. When any does exist, it is destroyed by silly interjections, such as, when the password to a secret door in "mint" condition is "Polo". That type of humour may be at home in Terrormolinos but is totally out of place here.

The whole approach seems rather dated, with parser and text compression being extremely limited. I spent over two hours trying to empty a bottle of oil in the Dragon's lair, only to eventually discover the only wording the game understood was POUR OIL.

It is a shame that the memory taken up by the combats and fancy screen display couldn't be better utilised by creating more locations or by improving room descriptions. To see how Dungeons and Dragons could be incorporated in a text adventure Incentive need have looked no further than US Gold's superb Rebel Planet.



INCENTIVE
THE KET
TRILOGY
BBC/ELECTRON
THE COMPLETE ADVENTURE CLASSIC
THREE GIANT ADVENTURE PROGRAMS COMBINE TO CREATE THE COLOSSAL KET TRILOGY

I don't recommend this adventure, as there are better examples of the same ilk around at much lower prices.

Pendragon

Price: £9.95. Supplier: Incentive Software, 2 Minerva House, Calleva Park, Aldermaston, Berkshire RG7 4QW. Tel: 07356 77288

Tarzan

★ ★ ★ ★

ONE of the most famous characters of fiction, Tarzan of the Apes, has been brought to the BBC Micro courtesy of Martech. Another example of the popular "explore and collect" arcade/adventure games, spanning many hundreds of finely detailed screens, it is available on both cassette and disc, and appears to work perfectly on the Master, a point not mentioned on the packaging.

Jane has been kidnapped by the evil Usanga, chief of the Wamabo, and it is up to Tarzan to rescue her. To do this you must guide our hero – using either keyboard or joystick – through jungles, caverns and tribal villages in search of seven stolen gemstones, with which to bargain for Jane's life. On the way you will find other objects to help you on your quest. The most striking features of the game are the superb graphics and animation – some of the best i've seen. The apeman himself can run, jump, duck, fight and somersault, all very realistically.

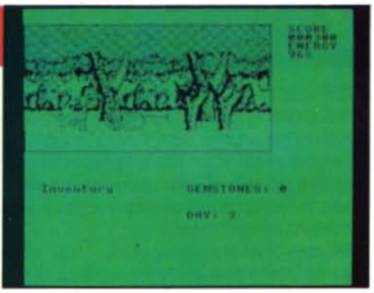
Price: £9.95 (cassette) £12.95 (disc). Supplier: Martech, Martech House, Bay Terrace, Pevensey Bay, East Sussex BN24 6EE. Tel: 0323 768456

Every screen teems with life – wild beasts, hostile natives and flying arrows, any of which will sap Tarzan's strength on contact. So much for being Lord of the Jungle.

The game has a time-limit of three days: one lost each time Tarzan's strength level falls below zero. I found this ridiculously minimal, but I'm sure it's just me being clumsy and falling prey to everything that moves.

The one feature that spoilt the game for me arises when you explore the various villages. If you come into contact with an arrow, not only does it sap your strength, it knocks you backwards a few paces.

In the village scenes, so many arrows are flying across the screen that you are buffetted around with no real control over your character. Crossing one screen may take more than a minute simply because of the number of arrows hitting you. I'm afraid my patience eventually gave out.



Visually, Tarzan is a very impressive game – but you have to rely a little too much on luck.

HacMan

Tanks!

★ ★ ★

DESIGN People Software has recently released Tanks! as a follow up to its successful Sink the Bismarck program. So if you're tired of steaming around the Atlantic, jump in your panzer and blast your way across Europe instead.

Tanks! is sold on disc only, as the program loads new code and data as the game develops. You are offered a choice of three scenarios: Western Europe 1944, North Africa 1942 or Russian Front 1943.

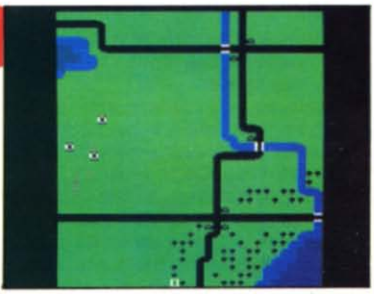
Having decided whether to represent the Allies or the Germans, it's time to select your forces. You have an allocation of 1000 points with which to build your army of tanks and support units. Each unit is worth a specific number of points, depending on how powerful it is.

Price: £13.95 (disc only). Supplier: Design People, Farnham Barn, Farnham, Saxmundham, Suffolk IP17 1LD. Tel: 0473 52555.

Every vehicle is displayed as a token on the playing area, but as these all look the same you have to select a unit with the cursor to discover what type it is, which soon becomes tedious. Enemy tanks are not displayed until one of your own units moves within sight. The movement phase of the game involves placing a cursor on the unit you wish to move. A simple, large scale diagram of the unit and its surrounding area is displayed.

If you move within range of an enemy tank the combat phase of the game is loaded. This could be loosely termed an arcade sequence – the two vehicles are small, hi-res characters. By rotating the turret you can fire on the enemy, and the result is displayed on a status window at the top of the screen. The action is nowhere near as much fun as that of Sink the Bismarck.

Passing too close to an enemy stronghold usually results in bazooka shells whizzing in your direction.



This sequence of movement and combat continues through the game, with the occasional air raid thrown in for good measure.

Sink the Bismarck was an excellent game. Unfortunately, Tanks! is not in the same league.

Jon Revis

Xor Designer

★ ★ ★

IN the May issue of *The Micro User* I reviewed a copy of Xor, a maze game which pushed the player's logic and cunning to the limits. Logotron has now released Xor Designer, a utility program that allows you to create your own fiendish mazes.

Supplied on disc only, it is totally menu driven. The main menu offers five options – the first being to play the game. Selecting this option boots up the data disc and displays a list of the mazes available. There are only two supplied with the package, so once you've completed these you'll have to design your own.

The second option allows you to design a maze. When using a program such as this, it is always useful to be able to edit a previously designed maze. You can familiarise yourself with the controls and you're not staring at vast expanses of nothing.

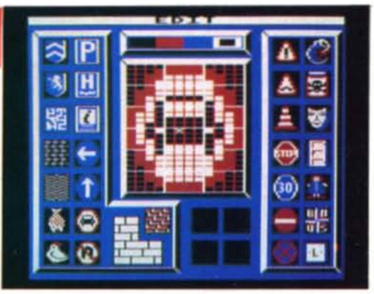
Price: £14.95 (disc only). Supplier: Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: 0223 323656

Both the mazes supplied have been saved to disc using the protect facility, designed to stop other people editing your mazes – it is very effective!

The Maze Editor consists of a miniature representation of the complete playing area, and a series of icons show the various game characters. Once you have lovingly positioned every character you can save your maze to disc, but not before the program has checked that the maze contains all the essential features of the game.

The Icon Designer enables you to create a new set of game characters. The original icons are always displayed on the editing screen as they are used, to denote their physical properties (fish fall downwards, chickens fall sideways, bombs explode) to the new characters.

Having successfully completed a maze you are given the opportunity to save your solution to disc, and this can be loaded back into the designer using the replay option. As its name suggests, replay redisplays the game move by move from beginning to end - a real ego trip!



The final option on the menu enables you to dump the maze, or a section of it, to a printer. It will even print out 16 enlarged sections of the maze which can then be pasted together to create a large poster.

Had the designer been sold at £14.95, complete with an editable copy of the original game, then I would have no reservations about recommending it. As it stands, I feel that it is overpriced.

Carol Barrow

Cholo

★ ★ ★ ★

BEFORE I start singing the praises of Firebird's new star for the BBC Model B, let me tell you about my first journey inside the city of Cholo.

The bunker air was hot and stale as I pulled a chair up to the console, but I had a job to do. The city of Cholo had been invaded, the inhabitants were cowering underground, and I was their last hope for freedom.

The Imager produced a spinning picture of Rizzo, a Rat-type which I could move around the city. I looked out through the droid's electronic eyes and consulted the map. I was in the central computer building, and it was time to do some hacking.

Soon I'd located the Cyber 1 computer and logged on. This is going to be easy, I thought, as I read the password list into my droid's first rampack.

Logging off, I left the building in search of prey. Just as I got through the door, I caught a glimpse of a droid – the chase was on! The little guy certainly could move, but the Rat was faster. A few bolts from the ion cannon and he was stopped dead in his tracks, motor circuits temporarily inoperative.

Slowly I moved up on it and logged on – best not to take any chances at this stage, though it looked harmless enough. "Enter password".

Luckily I'd made a note of the passwords the first time I ran the rampack. I was allowed three tries, but they were all unsuccessful. The interface was terminated, the little droid's repair circuits made good, and it was off.

It wasn't going to be as easy as I thought. I tracked him down and gave him another good pounding with the cannon. I logged on again, tried another password and got through. The droid's name was Igor, an odd sort of name I thought as I copied the contents of my rampack into his memory, just for safe keeping. I could have switched control to Igor, but Rat was more powerful.

I left Igor and headed off in the direction of Sladeck Robots Inc. in search of something with a bit more punch. I fancied taking control of a Guard Robot with armour and a more powerful cannon.

Turning on to Bridge Street, something more useful – a Flying Eye – floated into view. Her name was Anneka and she flew like a dream – just what I needed to spy on the bunker head.

Price: £17.95 (disc only). Supplier: Firebird, 64-76 New Oxford Street, London WC1A 1PS. Tel: 01-379 6755

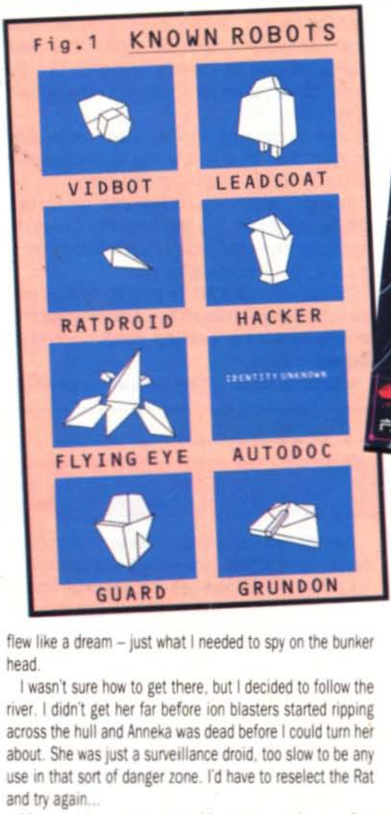


Fig.1 KNOWN ROBOTS

I wasn't sure how to get there, but I decided to follow the river. I didn't get her far before ion blasters started ripping across the hull and Anneka was dead before I could turn her about. She was just a surveillance droid, too slow to be any use in that sort of danger zone. I'd have to reselect the Rat and try again...

I have not been so engrossed by any game since my first encounter with the bad guys in Elite. In fact Cholo could be described as Elite II.

Yet in Elite your objective was to ply for trade between the star systems, make money and blast anyone who didn't agree. In Cholo your goal is much more definite and the execution is more subtle too: To free yourself and the inhabitants of the city.

To help you there is a host of slightly misguided robots.

BBC 'B'
CHOLO
FIREBIRD
GOLD

And the closer you get to finishing the game the dafter they become. In one notable encounter, a guard was so bored of shooting at me that it rammed my poor little droid into the river! Nice touch that.

In Cholo, as with every adventure game worth its salt, there always seems to be just one more obstacle around the corner, and there are plenty of corners in Cholo. The control keys are numerous with each robot having a different set.

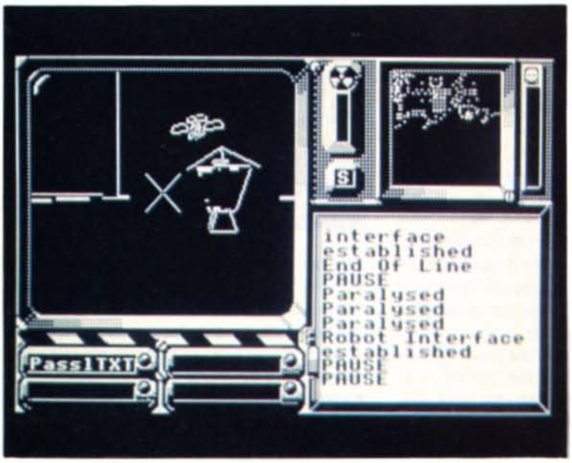
I have to say that I liked Cholo, though the sound, apart from the start-up tune, is a little poor. The 3D effects could be better too, as large buildings have a nasty habit of appearing right in front of you, though this does not detract from the game much and is little more than a minor irritation.

The manual is clear and concise, but due to the nature of the game, it doesn't give very much away. The novella at the back makes interesting reading.

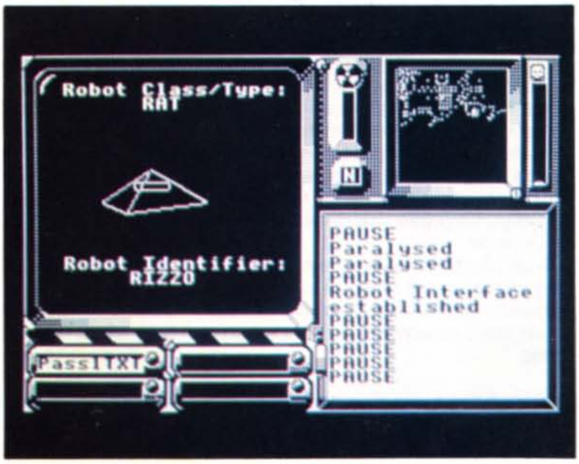
In conclusion, I think that it's overpriced for the average gameplayer, even with all of the extra material – and there are a few bugs. But for a game that is destined to become another classic it's probably worth it.

The scene is set, the lights are down and the inhabitants of Cholo await you.

Mark Smiddy



```
interface
established
End Of Line
PAUSE
Paralysed
Paralysed
Paralysed
Robot Interface
established
PAUSE
PAUSE
```



```
Robot Class/Type:
RAT
Robot Identifier:
RIZZO
```

```
PAUSE
Paralysed
Paralysed
PAUSE
Robot Interface
established
PAUSE
PAUSE
PAUSE
PAUSE
PAUSE
```

Waiting game is over...

Print and program at the same time with Terry Blunt's Master Printer Buffer

HOW many times have you written a program or piece of text, started printing it and then had to wait for ages for the printing to end?

The problem lies in the size of the printer buffer – the area of memory in which characters awaiting printing can be stored. In the BBC Micro this space is 64 bytes, which is fine for printing one short line but hopeless for anything longer.

Some printers contain their own printer buffers, and you can also buy add-on buffers up to 512k, but they are very expensive.

If you own a Master, a B+128 or a Master Compact, you have all the space you need for a printer buffer just waiting to be used.

Master Printer Buffer produces a rom image which can be loaded into one bank of sideways ram and allows as many other banks as you have of sideways ram to be used as a continuous printer buffer – on the Master and Compact this is a massive 48k.

If you blow the rom image into an eprom and plug this into your micro, machines with just one bank of ram can use it as a single 16k printer buffer. Or you'll have a 64k buffer on the Master.

If ram is put into both cartridges on the Master the buffer size becomes 128k. The theoretical maximum is 240k, with one of those expansions that lets you page out sections of the bundled software rom.

On the Master any ram sockets that contain rom images will not be overwritten unless they are currently UNPLUGed. The same is true of any ram bank that has been reserved with either SRROM or SRDATA.

When the buffer is active, a hard reset will clear and disconnect it completely, whereas a soft reset makes it only temporarily dormant. Sending any character to the printer will re-awaken it and let it continue where it left off. I use the sequence Control+B, Control+A, Control+@, Control+C.

When enabled with *BUFFER, or after a soft reset, the current buffer size is printed in the form Buffer 16k * (n), where (n) is the number of sockets used.

You can disable it with *BUFFER O. Error checks prevent you from either connecting the buffer while the printer is already active, or disabling it while there are still characters to be printed.

The insert character and remove character vectors are fully supported. The count/purge vector is only partially so. This is for two reasons.

On the one hand, if you have a full buffer printing, and then run a program containing a *FX15,0 the last thing you want is to lose the contents of the buffer. The two ways the printer buffer can be purged are to press Copy + Escape or use the command *BUFFER C.

The exception is when *FX5,0 has been entered which causes the MOS to direct inserts through the purge vector.

The other problem occurs when counting the space left in the buffer. The buffer size is returned in X and Y which only permits numbers up to &FFFF. To prevent larger values rolling round through zero, if the number of characters free is 64k or greater, the value &FFFF is returned.

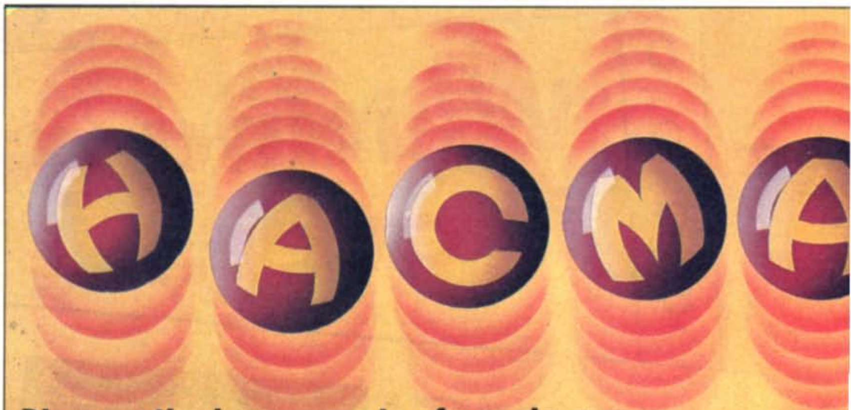
The program is designed to work only with Basic II or better. Once you have keyed in the program save it before you run it, as some typing errors could cause the source program to be overwritten by machine code.

Only instructions available to the 6502 have been used so that the code will work on all models. But for the Master, Compact and Bs with the 6502 replaced by a 65C02, code sequences such as TXA:PHA can be replaced by PHX, and CLC:BCC xxxx becomes BRA xxxx. The July disc of programs from *The Micro User* contains both the version listed here and the 65C02 only version for you to compare.

So there it is – now you can print a long document and at the same time write a program or play a game! ■

```
***** Start of Listing *****
  100 REM Master Pri
nter Buffer
  110 REM by Terry B
lunt
  120 REM 10/2/87
  130 MODE 135
  140 HIMEM=&6000
  150 PRINT'"Workin
g";
  160 zero=&70
  170 line=&F2
  180 Rnum=&F4
  190 stak=&0100
  200 brkv=&0206
  210 insv=&022A
  220 remv=&022C
  230 cnpv=&022E
  240 pbuf=&0880
  250 Rflg=&0DF0
  260 romsel=&FE30
  270 extvec=&FF00
  280 osasci=&FFE3
  290 osnewl=&FFE7
  300 oswrch=&FFEE
  310 osbyte=&FFF4
  320 Xsto=pbuf+8
  330 Ysto=Xsto+1
  340 mpty=Ysto+1
  350 full=mpty+1
  360 Rtab=full+1
  370 Rmax=Rtab+16
  380 Rinp=Rmax+1
  390 Rout=Rinp+1
  400 nins=Rout+1
  410 nrem=nins+2
  420 ncnp=nrem+2
  430 tran=ncnp+2
  440 tinp=tran+10
  450 tout=tran+15
  460 FOR I%=4 TO 6
STEP 2
  470 O%=HIMEM
  480 P%=&8000
  490 [OPT I%
  500 .start
  510  BRK:BRK:BRK
  520  JMP entry
  530  EQUB &82
  540  EQUB (copy-st
art)
  550  EQUB &02
  560 .title
  570  EQUS "Printer
Buffer"
  580 .copy
  590  BRK
  600  EQUS "(C) Me!
1987"
  610  BRK
  620 .escape
  630  LDY &FF
  640  BPL end
  650  LDA #&79
  660  LDX #&E9
  670  LDY #&00
  680  JSR osbyte
  690  TXA
  700  BPL end
  710  JSR clear
  720  BNE end
  730 .entry
  740  PHP
  750  TAX:PHA
  760  TYA:PHA
  770  CPX #02
  780  BEQ init
  790  CPX #04
  800  BEQ command
  810  CPX #06
  820  BEQ escape
  830  CPX #09
  840  BEQ help
  850  CPX #27
  860  BEQ recon
  870 .end
  880  PLA:TAY
```

PART 5



Discover the inner secrets of arcade games

STARTING us off this month are a few tips for the recently released Superior Collections, Volumes 1 and 2. Each of these two compilations has seven oldies and a previously unreleased game, thereby giving everyone an incentive to buy. Although many of the original games are not Master compatible the versions in these compilations are.

Nick Lacey has written in with extra lives pokes for both the original and the new cassette versions of Wallaby. For the former:

```
PAGE=&2C00
LOAD"WALLY2"
4 ?&3D61=number of lives
```

Then type RUN. The sound envelopes will be lost but you now have up to 128 lives.

For the version on the Superior Collection Volume 1:

```
LOAD"WALLY1"
*FX10 0
1895 END
```

Then type RUN and when the prompt appears enter:

```
PAGE=&2C00
LOAD""
4 ?&1869=number of lives
```

Type RUN and the game will play normally including the envelopes, with the required number of lives, up to 128.

Robin Weston of Kibworth has a tip for Space Pilot. If you hold down the Caps Lock and Control keys and press Escape you are advanced to the next level.

The top left-hand corner of the display which shows the remaining number of attack waves in the current round, will be corrupted, but it does not affect the running of the game. Robin's tip works with both the original game and the version on Collection 2.

Incidentally, the speech (via the Acorn Speech System) found in the original Space Pilot is no longer there, which seems a pity. It's a feature of many Peter Johnson games and it has been retained, I'm glad to see, in the Superior Collection versions of Deathstar (née Sinistar) and Overdrive.

Also on Collection 2 is Battletank, a respectable version of the arcade favourite Battlezone. It is also the subject of a most unusual poke, courtesy of Kevin Matthews of High Wycombe. Kevin's routine enables you to play the game with your own high score displayed on the instrument panel. Enter

```
LOAD"BATTLE"
425 STOP
RUN
```

After the program has STOPped type:

```
PAGE=&4700:CLEAR
LOAD""
```

When CONTROL has loaded enter:

```
220$&1A9C="0056080":PRINT
TAB(1,28);"HIGH: 0056080"
RUN
```

Just change 0056080 in this example to your own high score, but note the leading zeros. The score itself must be exactly seven digits long.

I've been borrowing a Master for a few days, and while very impressed by its capabilities I've hit one major snag – software. Although I find that most of my roms, utilities and adventures work perfectly, a number of arcade games do not. These appear to fall into three main catagories.

Firstly, many games such as Zany Kong Junior and Manic Miner rely on reading the presence of defined characters. On a BBC B these are located in memory at &C00 to &CFF – 256 bytes. Each definition is eight bytes long; it therefore follows that at any one time only 32 characters can be redefined.

On the Master all but the 32 control characters can be redefined, and the definitions workspace is located elsewhere.

Some games *LOAD predefined characters directly into page &C; at best these games will play with some rather strange looking characters, at worst they may not play at all.

As anyone brave enough to study the original User Guide will know, a character is defined by issuing a VDU23 command. The answer therefore is to convert the data stored in page &C to the format of a VDU23 command. The following line does just that:

```
FOR I%=0 TO 31:VDU 23,128
+I%:FOR J%=&C00 TO &C07:V
DU J%?(I%*8):NEXT:NEXT
```

The base number, 128, is the most likely to correct strange character definitions. If you still get weird characters try 224, 160 or 192.

Another way around the problem is to write a Basic program to issue the VDU23 commands. Listing 1 reads the data from page &C and SPOOLs it to a file called HELLO in a format in which it can be EXECed back again, either as a standalone file or merged with another program already in memory.

As the program stands it will create a SPOOLed file starting at line 1500 with line increments of 10, reading the 32 characters from 128 to 159.

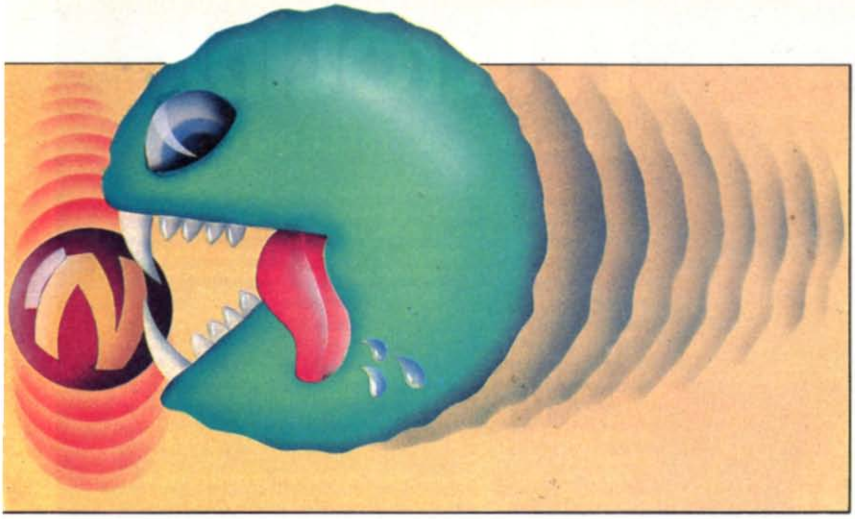
If this does not work, change start% as above. If you want to be absolutely thorough and correct all strange definitions, you could change end% to 255, but the resulting datafile would take up a lot of disc space or take ages to load from cassette.

The second problem involves games making direct calls to machine operating system rom routines – Wizadore and Atic Atac spring to mind.

Acorn's original idea of there being a

```
   10 REM Master VDU23 generator
   20 REM by Hac-Man 1987
   30 REM (C) The Micro User
   40 REM
   50 *SPOOL HELLO
   60 start%=128:end%=start%+31:step%=10
:line%=1500
   70 FOR I%=start% TO end%
   80 PRINT;step%*(I%-start%)+line%;" VD
U23,";I%;
   90 FOR J%=0 TO 7
  100 PRINT",";?(8*(I%-start%)+J%+&C00);
  120 NEXT:PRINT CHR$(13):NEXT
  130 *SPOOL
```

Listing I: VDU 23 generator



fixed entry point for each OS routine is a stroke of genius, as it allows any piece of software to be upwardly compatible with any future BBC Micro.

A fixed OS entry point is, however, only a jump to the contents of a vector in page 2 of the memory map.

For example, to print a character on the screen from machine code the VDU routine oswrch is called at its entry point, &FFEE. This then jumps to the address held in the two page 2 bytes &20E and &20F, otherwise known as wrchv.

The full sequence is, therefore, jump to &FFEE, check the contents of &20E and &20F and jump to this address, memory location &E0A4 in OS 1.20.

This is obviously time-consuming. To speed things up, some games bypass this &FFEE entry point altogether and jump directly to &E0A4. This means that they can be used only with OS1.20. This is totally unnecessary, as once again good old Acorn has thought of everything.

The original values of all the page 2 vectors are stored as a lookup table in the MOS. In operating systems 1.20 and later, the address of this table is held in memory locations &FFB7 and &FFB8. The value of any vector is therefore held in the OS rom as a fixed offset of the contents of this address.

To use our earlier example, if a game needs to write directly to the MOS VDU driver routine on the Master 128 with OS3.20, reading the contents of &FFB7 and &FFB8 gives the address &E2D7.

As the OSWRCH vector is located at &20E and &20F, the offset is therefore &E. Reading the contents of locations &E2E5 (&E2D7 + &E) and &E2E6 gives the double byte &E822, the address of the VDU driver routine in OS 3.20. Following the same procedure with OS 1.20 gives &E0A4, the value mentioned earlier.

Listing II applies this principle to Ultimate's great shoot-'em-up, Jet-Pac, converting it for use on the Master and both models of the B+. PROCconvert reads the vector lookup table and "edits" the game so that each rom call is to the correct address for that version of the MOS. It should be possible to use PROCconvert, suitably modified, with any program using direct rom calls.

Incidentally, Jet-Pac is available both as an individual title and on each of the two Ultimate compilations Unbelievable Ultimate and Cosmic Battlezones.

Unbelievable is in fact one of a series of compilations going under the general title of Master Games. Guess which computer they DON'T run on. In fact, not one of the other titles on either compilation will work with anything but OS 1.20.

```
   10 REM Jet-Pac MOS call converter
   20 REM by Hac-Man 1987
   30 REM (C) The Micro User
   40 !&900=&00A28CA9:!&904=&F42000A0
   50 !&908=&A2E5A9FF:!&90C=&2000A001
   60 !&910=&35A9FFF4:!&914=&A902208D
   70 !&918=&02218D09:!&91C=&04A20EA9
   80 !&920=&F42000A0:!&924=&A04AA2FF
   90 !&928=&FFF72009:!&92C=&04A20DA9
  100 !&930=&F44C00A0:!&934=&8A4808FF
  110 !&938=&AD489848:!&93C=&FE2903CA
  120 !&940=&6803CA8D:!&944=&68AA68A8
  130 !&948=&2E4C6028:!&94C=&2D54454A
  140 !&950=&0D434150:!&954=&0059004C
  150 CALL &900
  160 PROCconvert
  170 CALL &954
  180 END
10000 DEFPROCconvert
10010 Z%=!&FFB7 AND &FFFF
10020 ?&3025=Z%?&E:?&302A=Z%?&F
10030 ?&3034=Z%?&E:?&3035=Z%?&F
10040 ?&303A=Z%?&E:?&303B=Z%?&F
10050 FOR I%=0 TO &100
10060 IF I%?&3D00=&72 AND I%?&3D01=&E7 T
HEN I%?&3D00=Z%?&A:I%?&3D01=Z%?&B
10070 NEXT
10080 ?&4860=Z%?&20:?&4865=Z%?&21
10090 ?&5904=?&FFB7:?&5905=?&FFB8
10100 ENDPROC
```

Listing II: Jet-Pac MOS call converter

This brings me to the last, and most unnecessary, problem – software protection. A number of loading routines use hardware directly, namely the serial interface chip – made by Ferranti on most models of the B – and 8271 disc controller.

In place of these the B+, Master and a few BBC B Micros use a different serial chip, made by Acorn, and the 1770 disc controller. Major problem programs are Caveman Capers and the disc version of The Hobbit.

Other games prevent users from tampering with the games by overwriting the vectors used by all OS routines with the original vectors stored in the OS rom. Unfortunately these original vectors are often transferred from a specific point in the rom.

In every new operating system to date the vector table has been in a different location; a machine with the wrong MOS doesn't stand a chance of running a game protected like this. Notable culprits are Alien-8 and Dr Who.

Given the excellent protection systems in use today, it seems a great pity that some software producers should choose to limit their potential market in this way. Unfortunately, this problem is between you and the software company. I wish you the best of luck.

On to brighter things, Superior Software does not mention in its advertising for Repton 3 that if you load the disc version into a Master both the game and editor will be loaded into sideways and you can switch between them simply by pressing Break.

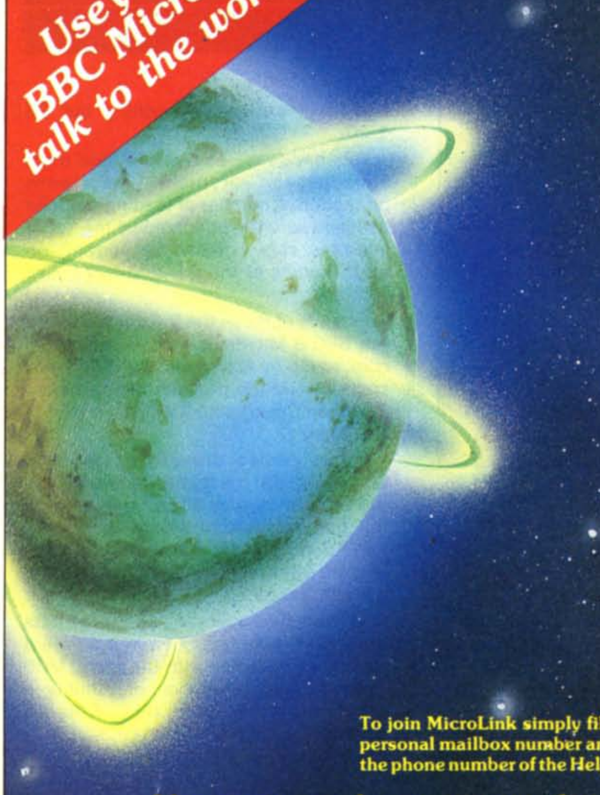
Unfortunately selecting the game always starts with the Prelude screens and selecting the editor always starts with nothing loaded. It would be very useful for the development of defined screens if whatever you were previously running remained intact.

To finish this month we have a number of pokes for the disc version of Repton 3. Type PAGE=&900:LOAD"REPTON1", then enter any of the following as line 115:

?&FED=0	You do not need to collect any diamonds or kill any monsters.
?&2FF4=0	You do not need to collect any crowns.
!&301D= &08A9 EAEA	Finish the game after completing the first screen.
?&311c+&A9: ?&311D=1	For infinite lives.
?&1B5A=x	Number of lives.

Type RUN to start the game as normal.

● *Next month, in answer to a number of requests, I'll be giving some pokes for early classic BBC arcade games.*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MU7

Dick Poulter offers the power of a word processor applied to typing in listings

Listings at your leisure

TYPING lines into your computer is quite straightforward, but if you get to the end of some long and complicated line it is very frustrating to see that you've made a mistake near the start. It would be nice to have the power of a word processor at your fingertips.

With this utility you will be able to edit an input line as if you were using a word processor. You can move the cursor backwards and forwards within the line, deleting and inserting characters as you go – and you still retain the ability to copy other text on the screen.

Table I gives a summary of the new controls available, but Control+U and Control+F require a little explanation. Control+U followed by any other character allows you to delete the line from your current position up to the character specified.

And Control+F, plus any other character, moves the cursor forwards to the character specified.

One special feature is that pressing the copy key when the input line is empty and you are not copying another part of the screen results in the last line edited being printed out and becoming the current line. This means that if the Basic command:

```
INPUT A$
```

is being performed, and you press copy, the old value of *A$* is presented on screen for editing.

Type in Listing I and save it as Ext.Src. When you run it the code is created and a file called Exted is saved. You will be left in Basic, with the extended line editor set up, and ready for use.

This is how the program works. All properly behaved programs which require a simple line input use the MOS routine osword 0, available on all models of BBC Micro, to get the line.

The Exted program intercepts the osword vector at address &20C and when the code is entered it checks to see that the accumulator contains zero. If not a different osword function is wanted, and this request is passed on to the mos.

When an osword 0 has been requested the new Exted code is used instead of the MOS routine, and you have access to all the improved functions.

The extended line editor uses pages &900 to &B00, and so corrupts the function key space in B and B+ machines. It also means that after a soft break there is some rubbish on the screen.

To re-install the code after Break just CALL &900. To run the program after you have switched on, type *RUN exted or just *exted if you have a disc system. So there you have it, an enhanced routine which will dramatically improve your processing power.

Cursor	Move line cursor
Shift+Cursor	Move input cursor
Delete	Backwards delete
Shift+Delete	Forwards delete
Tab	Toggle cursor control
Shift+Tab	Toggle overwrite/ insert
Control+U <key>	Kill text up to <key>
Control+F <key>	Move up to next <key>
Escape	Abort Input

Table I Editing control keys

```
 100 REM ***************************
 110 REM *  Extended Line Editor   *
 120 REM *    by Dick Poulter      *
 130 REM * (c) The Micro User '87 *
 140 REM ***************************
 150 Q%=&900
 160 O%=&FFF4:W%=&FFEE:W2%=&FFE3
 170 G%=&FFE0:N%=&FFE7
 180 owv=&20C
 190 pb=&90
 200 len=pb::min=pb+1:max=pb+2
 210 xb=pb+3:yb=pb+4:yt=pb+5:ext=pb+6
 220 i2=pb+7:oldflg=pb+8:stat=pb+9
 230 scrw=pb+10:scrh=pb+11
 240 inp=pb+12:idx=pb+14
 250 FORl=0TO2STEP2:P%=Q%:[OPTl
 260 .setup
 270 LDX owv:LDY owv+1
 280 STX exit+1:STY exit+2
 290 LDA#225:LDX#0:JSR obW
 300 LDX#osword MOD256
 310 LDY#osword DIV256
 320 SEI:STX owv:STY owv+1:CLI:RTS
 330 .osword
 340 CMP#0:BEQ entry
 350 .exit JMP&FFFF
 360 .entry STX &AE:STY &AF
 370 LDY#&F:.push LDA pb,Y:PHA
 380 DEY:BPL push:STY oldflg:INY
 390 STY idx:STY ext
 400 LDA (&AE),Y:STA inp
 410 INY:STY stat:LDA (&AE),Y:STA inp+1
 420 .inf INY:LDA (&AE),Y:STA len-2,Y
 430 CPY#4:BNE inf
 440 LDA &30A:SEC:SBC &308:STA scrw
 450 LDA &309:SEC:SBC &30B:STA scrh
 460 INC scrh:INC scrw
 470 LDA#237:LDX#0:JSR obR:TXA:PHA
 480 LDA#219:LDX#0:JSR obR:TXA:PHA
 490 LDA#219:LDX#9:JSR obW
 500 JSR edit
 510 STY &AE:PHP:PLA:STA &AF
 520 PLA:TAX:LDA#219:JSR obW
 530 PLA:TAX:LDA#4:JSR O%
 540 LDX#0:.pull PLA:STA pb,X
 550 INX:CPX#16:BNE pull
 560 LDA &AF:PHA:LDY &AE:PLP:RTS
 570 .edit JSR edmo
 580 JSR pos:STX xb:STY yb
 590 .edp JSR cp
 600 .ed
 610 LSR oldflg
 620 JSR G%:LDY ext:BCC ed1
 630 .exed STY idx:JSR cp:SEC:RTS
 640 .ed1 CMP#&D:BNE ed2:STA (inp),Y
 650 JSR exed:JSR N%:LDY ext:CLC:RTS
 660 .ed2 PHA
 670 LDA#129:LDX#&FF:JSR obR
 680 ASL stat:CPX#&FF:ROR stat
 690 PLA:LDY idx
 700 CMP#9:BNE ed3
 710 BIT stat:BMI ed2s
 720 LDA stat:EOR#1:STA stat
 730 JSR edmo:JMP ed
 740 .ed2s LDA stat:EOR#64:STA stat
 750 JMP ed
 760 .ed3 CMP#135:BCC ed3cp
 770 CMP#140:BCS ed7:BIT stat:BPL ed3cp
 780 PHA:LDA stat:AND#&FE:STA stat
 790 JSR edmo:PLA:CLC:ADC#4:TAY
 800 LDA#138:LDX#0:JSR O%:JMP edp
 810 .ed3cp CMP#135:BNE ed3l
 820 LDY ext:BNE ed
 830 .ed3c LDA (inp),Y:CMP#&D:BEQ ed3c2
 840 INY:BNE ed3c:.edj JMP ed
 850 .ed3c2 STY ext
 860 LDY#0:SEC:JSR repri:JMP edp
 870 .ed3l CMP#136:BNE ed3r
 880 CPY#0:BEQ edj:DEC idx:JMP edp
 890 .ed3r CMP#137:BNE ed3d
 900 CPY ext:BCS edj:INC idx:JMP edp
 910 .ed3d CMP#138:BNE ed3u:TYA:CLC
 920 ADC scrw:CMP ext:BEQ P%+4:BCS edj
 930 STA idx:.edpj JMPedp
 940 .ed3u CMP#139:BNE ed7:TYA:SEC
 950 SBC scrw:BCC edj:STA idx:JMP edp
 960 .ed7 CMP#6:BNE ed8:JSR G%
 970 .edF CPY ext:BCS edpj:INY:STY idx
 980 CMP (inp),Y:BEQ edpj:BNE edF
 990 BEQ edj:INY:STY idx:BNE edF
1000 .ed8 CMP#21:BNE ed9a:JSR G%
```

◀ *From Page 41*

```
1010 .edK CPY ext:DEY:BCS edK2:INY:INY
1020 CMP (inp),Y:BNE edK:DEY
1030 .edK2 JSR fwddel:JMP edp
1040 .ed9a CMP#127:BNE ed9
1050 BIT stat:BMI ed9fd
1060 JSR bakdel:JMP edp
1070 .ed9fd LDY idx:JMP edK2
1080 .ed9 CMP#32:BCS ed10:JSR W%
1090 .ed10 CMP min:BCS P%+5:JMP edp
1100 CMP max:BEQ edst:BCC edst:JMP edp
1110 .edst
1120 LDX ext:CPY ext:BEQ edadd
1130 BIT stat:BVC edins
1140 JSR W%:STA (inp),Y:LDA#137:JMP ed3
1150 .edadd CPX len:BCC edadd2
1160 .noroom LDA#7:JSRW%:JMP edp
1170 .edadd2 STA (inp),Y:JMP edst1
1180 .edins CPX len:BCS noroom:PHA
1190 .edi2 LDYext:.edi21 DEY:LDA(inp),Y
1200 INY:STA(inp),Y:DEY
1210 CPY idx:BNE edi21:PLA:STA (inp),Y
1220 .edst1 INC ext:LDYidx:SEC:JSRrepri
1230 INC idx:JMP edp
1240 .fwddel
1250 CPY ext:BNEP%+3:RTS:STY yt
1260 LDA idx:STA i2
1270 .fwd2 INY:CPY ext:BCS fwd3
1280 LDA(inp),Y:TAX:TYA:PHA:TXA
1290 LDY i2:STA(inp),Y:PLA:TAY
1300 INC i2:BNE fwd2
1310 .fwd3 LDA ext:CLC:SBC yt:CLC
1320 ADC idx:STA ext:LDY idx:JSR repri
1330 LDA yt:SEC:SBC idx:TAX:INX
1340 LDA#32:JSRW%:DEX:BNEP%-4:RTS
1350 .repri PHP:CPY ext:BCS erepr
1360 LDA(inp),Y:JSRW%:INY:BNE repri+1
1370 .erepr PLP:BCC erep2
1380 LDA ext:CLC:ADC xb:LDY#&FF:SEC
1390 .erep1 INY:SBC scrw:BCS erep1
1400 TYA:SEC:ADC yb:SEC:SBC scrh
1410 BCC erep2:EOR#&FF
1420 SEC:ADC yb:STA yb:.erep2 RTS
1430 .bakdel
1440 LDY idx:CPY#0:BNEP%+3:RTS
1450 LDA#127:JSRW%:CPY ext:BEQ bak3
1460 .bak2 CPY ext:BEQ bak3
1470 LDA(inp),Y:DEY:STA(inp),Y
1480 INY:INY:BNE bak2
1490 .bak3 DEC ext:DEC idx
1500 LDY idx:CLC:JSR repri:LDA#32:JMPW%
1510 .cp LDA#31:JSR W%
1520 LDY#&FF:LDA idx:CLC:ADC xb:SEC
1530 .cpxy INY:TAX:SBC scrw:BCS cpxy
1540 TXA:JSR W%:TYA:CLC:ADC yb:JMP W%
1550 .pos LDA#134:JMP O%
1560 .obW LDY#0:JMP O%
1570 .obR LDY#&FF:JMP O%
1580 .edmo
1590 LDA stat:AND#1:TAX:LDA#4:JMP O%
1600 ]NEXT
1610 IF owv?1=osword DIV256 END
1620 CALL setup
1630 MODE7
1640 T$="Super Line Editor Extension"
1650 FOR L%=1 TO 2
1660 VDU 31,2,L%,129,157,131,141
1670 PRINTT$"   "CHR$156:NEXT
1680 PRINT'SPC8"(C) The Micro User '87"
1690 PRINT'"Keys:":REPEAT READ K$,KF$
1700 PRINTSPC(13-LENK$)K$" : "KF$
1710 UNTIL K$="ESCAPE"
1720 VDU 31;20
1730 $&780="SAVE EXTED "+STR$~Q%+" "+ST
R$~P%
1740 X%=&80:Y%=7:CALL&FFF7
1750 *BASIC
1760 DATA Cursors,Move Line Cursor
1770 DATA SHIFT-Cursors,Move Input Curs
or
1780 DATA DELETE,Backwards Delete
1790 DATA SHIFT-DELETE,Forwards Delete
1800 DATA TAB,Toggle Cursor Control
1810 DATA SHIFT-TAB,Toggle Overwrite/In
sert
1820 DATA CTRL-U <key>,Kill Text Up to
<key>
1830 DATA CTRL-F <key>,Move up to Next
<key>
1840 DATA ESCAPE,stop editting
```

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Pete Bibby introduces another logical operator into conditional statements

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BEGIN HERE

Part 19

And now we come to AND

IF you've followed everything we've covered so far, Program I – last month's Program VI – should cause you no problems:

```
   10 REM Program I
   20 FOR loop=1 TO 5
   30 READ number
   40 IF number>=10 THEN IF number<=20 T
HEN PRINT; number" is between 10 and 20
inclusive"
   50 NEXT loop
   60 DATA 10,13,15,17,20
```

It consists of a FOR...NEXT loop which cycles five times. Each time, it reads in a number from the data line and tests to see if it lies in the range 10 to 20.

Doing testing is line 40. It consists of a nested IF...THEN, the structure we met last time. This month we'll be looking at a rather more elegant way of achieving the same effect.

As we've seen, the IF...THEN construction takes the form:

```
IF expression THEN perform action
```

or, more accurately:

```
IF condition is true THEN perform
```

So far, we've only had one expression or condition between the IF and the THEN. Of course we've had lines with two or three IFs and THENs but there's only ever been one condition between them. In effect, we've only been able to deal with such conditions as "if it's raining, then I'll stay at home".

In this case, the choice is simple – it's either raining or it's not. The trouble is that in real life we often come across more complicated conditions such as: "If it's wet or windy then I won't come", or "If it's warm and sunny then I'll be there".

Notice that now all sorts of possibilities open up. It could be sunny but not warm or it could be both wet and windy. What happens depends on the pair of conditions we've set.

It's often like this in programming. We don't just want to know if a number is positive, we want to know if it's larger than 100 and also divisible by 2.

Or to take another example, the ending of a game could depend on whether or not the time limit is up or you've lost your last laser base or both. In other words, we need to know the results of two or even more conditions before we can choose which action to take.

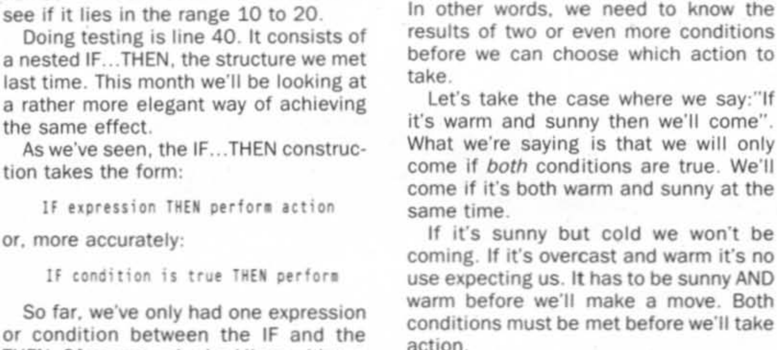
Let's take the case where we say:"If it's warm and sunny then we'll come". What we're saying is that we will only come if *both* conditions are true. We'll come if it's both warm and sunny at the same time.

If it's sunny but cold we won't be coming. If it's overcast and warm it's no use expecting us. It has to be sunny AND warm before we'll make a move. Both conditions must be met before we'll take action.

This can be summarised as:

```
IF both the first condition is true AND
the second condition is true THEN action
 is taken
```

As you'll agree, we make these kinds of decisions all the time. If the shop is open and I've got enough money then I'll buy a loaf. If I've got the money and the pub is open I'll buy a drink.



This isn't what I meant by a truth table

We make similar decisions in our programs. BBC Basic allows us to do this using the AND logical operator. Program II shows this in action:

```
   10 REM Program II
   20 FOR loop=1 TO 5
   30 PRINT "Enter two numbers"
   40 INPUT first,second
   50 IF first>=0 AND second=3 THEN PRIN
T;first;" is positive and the second num
ber is 3"
   60 NEXT loop
```

As you'll see from the listing, the program consists of a FOR...NEXT loop which cycles five times. Each time round the loop line 30 asks you to enter two numbers. Quick on its heels, line 40 stores them in *first* and *second*.

Line 50 contains our old friends IF and THEN (what ELSE? you might ask!). But now there are two conditions between them instead of the single expression we've been used to. Undaunted, the micro tests both conditions before coming to the THEN.

The first condition is:

```
first>=0
```

which checks to see whether *first* is either greater than or equal to zero. In other words, it checks to see if *first* is positive. If it is, then the condition is true and the micro makes a note of it. It then goes on to the second condition.

This is:

```
second=3
```

and is obviously only true if *second* is 3. Again the micro takes note of the result.

Now both these separate conditions are linked by the logical operator AND. This tells the computer that before it can proceed with whatever comes after the THEN, both the first condition and the second have to be true. For the message to be displayed, not only must the first condition be fulfilled, the second one must also be true.

In this case the first number has to

Turn to Page 44 ▶

◀ *From Page 43*

have a positive value at the same time as the second number is equal to 3. Then, and only then, will the rest of the line be obeyed.

Try this out for yourself. You can run Program II as many times as you want, but you'll never get the final message unless *first* is positive and *second* is 3.

The point about the AND operator is that *both* of the conditions have to be true before the part after the THEN is performed. It's no good the first condition being true while the second is false or vice versa. They've both got to be fulfilled or nothing happens. The two separate conditions have been joined into one joint condition by the logical operator AND.

```
   10 REM Program III
   20 FOR loop=1 TO 5
   30 READ number
   40 IF number>=10 AND number<=20 THEN
PRINT; number" is between 10 and 20 incl
usive"
   50 NEXT loop
   60 DATA 9,56,15,10,21
```

Take a look at Program III, which also uses two conditions joined by an AND. This does the same job as Program I but in a rather different way. As you can see, we have the familiar FOR...NEXT loop cycling five times. Each time round the loop line 30 reads in data from line 60 and stores it in *number*. Line 40 then subjects *number* to two tests:

```
number>=10
```

and

```
number<=20
```

The first condition is true if *number* is greater or equal to 10. The second condition is only true when *number* is less than or equal to 20.

However both conditions are joined by the logical operator AND. This, in effect, makes them one joint condition. Now the message isn't printed until *both* conditions are simultaneously true. In other words, for the code after the THEN to be performed, *number* must lie between 10 and 20 inclusive.

So the AND has linked the two conditions into one major condition which is only true when both the subsidiary ones are true. Should one or both be false, then the joint condition is false. Table I sums it up in what is known as a truth table.

first condition	second condition	joint condition
TRUE	TRUE	TRUE
FALSE	TRUE	FALSE
TRUE	FALSE	FALSE
FALSE	FALSE	FALSE

Table I: The AND truth table

It might make things clearer if you rewrite line 40 as:

```
   40 IF (number>=10 AND number<=20) THE
N PRINT; number" is between 10 and 20 in
clusive"
```

Here the two conditions are enclosed in brackets making the line look like our old friend:

```
IF expression THEN perform action
```

The only difference is that now the condition which decides whether the rest of the line is performed is made up of two subsidiary conditions joined with an AND.

● *And that's it for this time. Try running Program III with different conditions in line 40 and altered numbers in the data statements. See if you can understand what happens. Next month we'll be meeting some other logical operators.*

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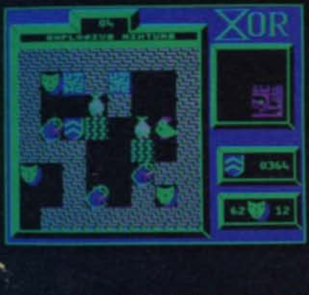

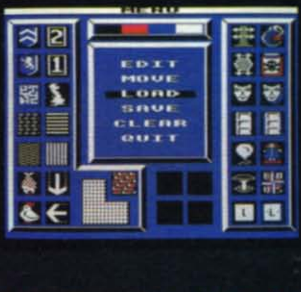

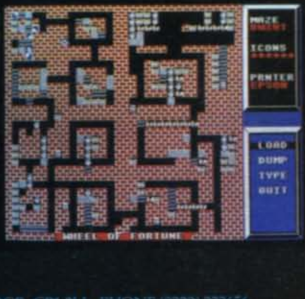

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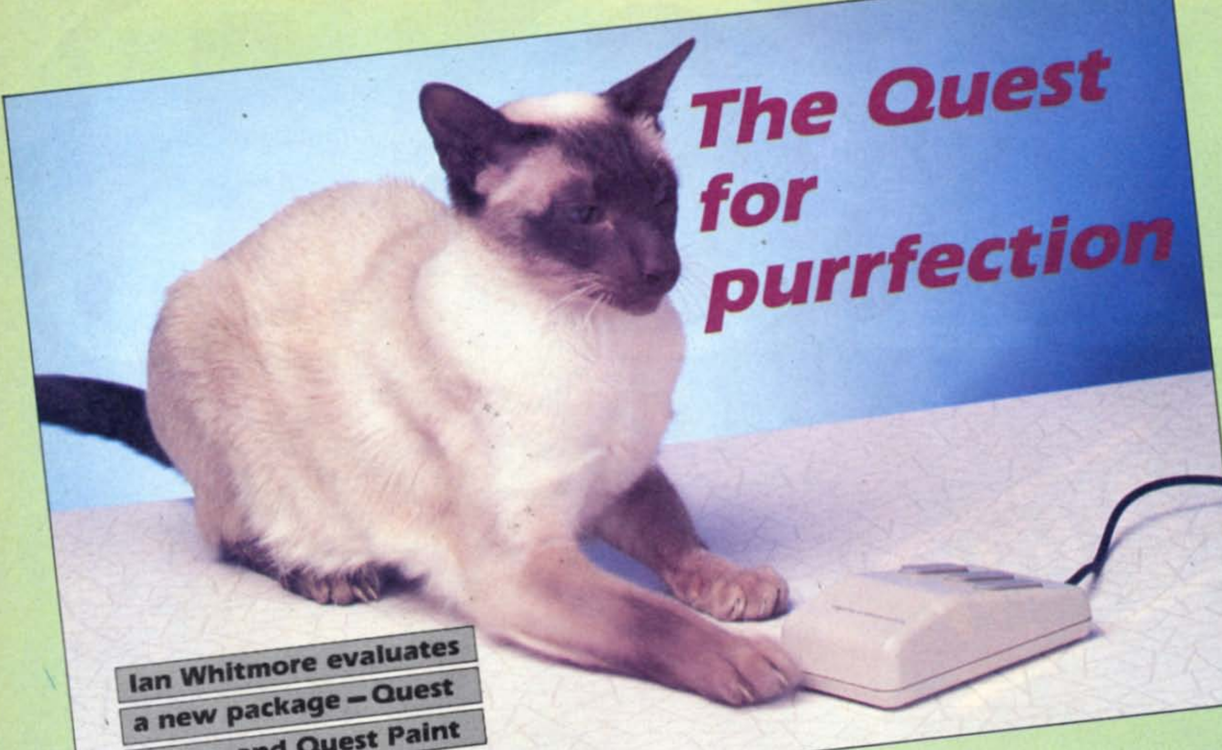

The Quest for purrfection

Ian Whitmore evaluates a new package – Quest Mouse and Quest Paint

WATFORD Electronics has entered the mouse market in its own right by selling a new art package – Quest Mouse and Quest Paint. The review package contained both, but mouse and software are available separately.

The mouse is larger than the AMX variety and coloured grey, not the standard Acorn beige. It has a one metre lead and a high quality user port plug. The ball, packed alongside the mouse, has to be inserted by the user.

Although simple, and to the previous mouse user obvious, there are no instructions in the manual for inserting it. The ball is heavy and coated with a rubber layer, enabling it to grip smooth surfaces without slipping.

The rodent fits nicely in the hand and provides accurate movement of on-screen pointers. In comparison with my original AMX Mouse using Quest software, the Quest one is approximately half as sensitive, needing twice the range of movement on the surface to move the pointer.

However, Quest mouse sensitivity is well matched to its own software and would only prove sluggish with the AMX program. Conversely, the use of an AMX mouse with Quest software might prove too sensitive, although the software does allow for half speed action.

Quest Paint comes on a 32k eprom mounted on a small circuit board and controlled by a Pal chip, so that the computer (B, B+, or Master) sees the software as a normal 16k sideways rom.

Although taller than the usual sideways rom, Quest Paint does not overhang other areas of the board when inserted into a B, B+ or Master, unlike some other Palprom systems recently introduced.

The Palprom is supported by a 40/80 track convertible utility disc which contains fonts, patterns, brushes, a printer driver and a program called Hand which is used by the Pan function.

A file called LDSCREEN can be called by a * command to load Quest Paint created screens when outside the Quest Paint environment.

The two remaining files are accessed by BOOTing the disc, and these allow you to create files on disc which support pictures larger than the screen and to customise the printer driver, which defaults to Epson codes.

Quest Paint works in Mode 1 using four basic colours. When called by *PAINT (or *WPAINT) the screen is cleared and after a few moments a white pencil appears on a black screen.

Moving this pointer to the top or the bottom of the screen and clicking the righthand button on the mouse (known by Watford as R and AMX as Cancel) reveals either of the two menus (see Figure 1). The upper, command, menu selects all the usual drawing facilities.

By moving the pointer over the box indicating any of the utilities, such as line, airbrush and so on, and clicking the L (or Execute) button on the mouse, a specific submenu for the chosen utility appears. This is displayed in the lower two lines of the upper menu.

For the illustrated example it allows you to choose between protect, cycle, single, lock pattern, no undo, cursor and the thickness of line.

You can choose or alter each of the items on the submenu, thus giving a great deal of control from a menu occupying only a small area of screen.

Pencil allows free hand drawing of lines in varying thickness, colour and patterns.

Line allows more accurate placing of straight lines by using the rubber-banding technique.

In Brush mode a colour or pattern is applied through the shape of the currently selected brush.

The Airbrush gives an area which is randomly sprayed to enable shading of pictures.

Replace allows you to replace one colour or pattern with another within a defined area while Fill allows an area bounded by a continuous line to be filled with a pattern or colour.

Cut and Paste allow areas of the screen to be selected and processed, before being pasted back on to the screen in another position.

Triangles, Rectangles, Polygons and Ellipses are selectable and can be drawn as outlines or solids in any colour or pattern.

Text may also be entered and a number of separate fonts are supplied on the utility disc. The string is entered from the keyboard and then manipulated on the screen.

One unusual facility is the Trace mode, which outlines any paper colour area within the selected box with a single line of ink pixels.

Two special selections are SCP/Grid and Global FX. SCP/Grid controls an invisible superimposed grid on which drawing is laid out and selects a stored

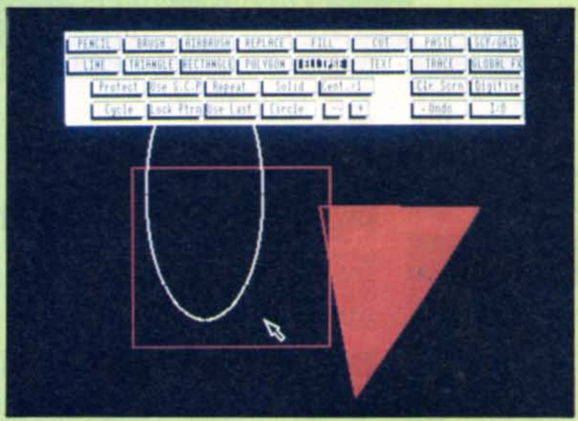

Figure I: Quest Paints command menu

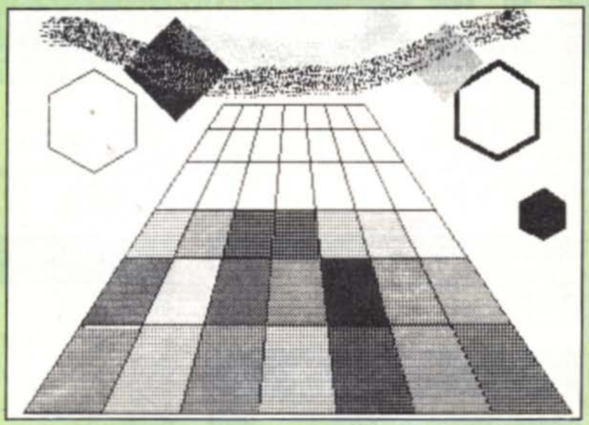

Figure II: A sample printout

cursor position. This can be used for creating perspective lines and for allowing many lines to radiate from the same point.

Global FX alters certain parameters such as the cycle time, repeat times, mouse sensitivity and flicker of moving lines.

The submenus allow colours to be cycled through a sequence chosen from the palette, colours to be protected from overwriting, the last size or shape to be repeated, colours to be selected as transparent and a whole host of other variations too numerous to mention in a review.

Many of these functions are special to only one or few of the basic commands, such as 45 lock for the straight line commands. This ensures that angles between lines fall in multiples of 45 degrees.

Two commands, Undo and Scrn Clr, allow the immediate last action to be undone and the screen to be cleared. The latter command needs to be selected twice with the left button to be active.

Digitise enables pictures to be imported via the Watford Digitiser.

I/O selects the input/output menu from which pictures, fonts, cutouts, brushes and patterns may be loaded and saved to the current filing system.

One disappointment here was that filenames all need to be entered from the keyboard. Quest Mouse and Quest Paint are not mouse-selectable as in other mouse-supporting packages such as Artist. This menu also allows you to dump images to the printer, using the disc-based printer driver.

The supplied driver allows dumps from quarter size to four times size (the larger sizes are printed in strips), in inverse, rotated and mirror-image modes. An example of a printout is in Figure II.

The lower, Palette, menu allows the choice of colours, brushes and patterns. Dither patterns – created by mixing pixels very close together – are supported, in addition to bolder patterns similar to those seen with previous drawing packages.

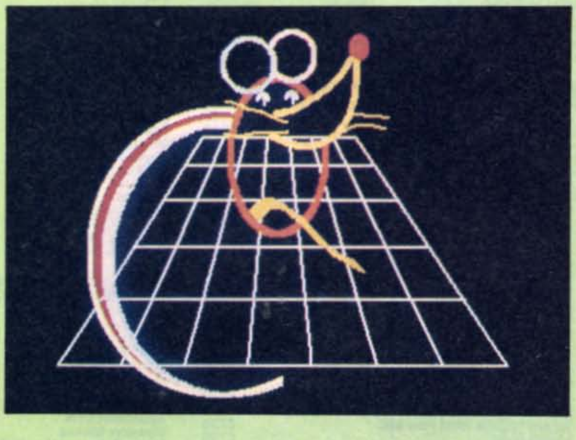

Figure III: The author's interpretation of the Quest Mouse logo

In addition, you can choose colours or patterns to be used in sequence when cycling, and to be protected and allowed to be transparent. A pattern and brush designer is also called from this menu.

Clicking the middle or M button (Move in AMX language) cycles the on-screen pointer through a number of options known as the Toolbox. These are an eraser, zoom mode and pan mode.

The eraser wipes the area under it to the paper colour. The zoom mode displays the selected area enlarged four or eight times at the bottom of the screen for detailed modification. The pan symbol moves the screen window on the extended picture file.

The area revealed by moving the screen image is loaded from disc while the area now covered by the margins of the screen is saved to disc. This mode allows you to create pictures far larger than screen or memory would normally support.

Quest Paint makes intelligent use of memory, using shadow ram and sideways ram when available. Shadow ram allows the use of the Undo command, while sideways ram supports both menus on screen at the same time and a small buffer for cutouts.

In use I found the Quest Mouse and Quest Paint easily and quickly understood, although it would be nice to have some examples on the utility disc of the sort of things that can be created.

The 60 page manual is packed with information and is reasonably easy to use.

One gripe, perhaps with Computer Concepts, not Watford, is that Spellmaster interferes with text entry in Quest Paint unless unplugged.

Quest Mouse and Quest Paint can hold their heads high in the market, being comparable to Wigmore House's Artist and Megamouse and the AMX Mouse and Superart. However both these older packages are a little more expensive.

Watford says another version of Quest Paint is on the way. It will have additional facilities to manipulate pictures – but will still not allow filenames to be chosen with the mouse.

Product: Quest Mouse and Quest Paint
Price: £67.85
Supplier: Watford Electronics, Jessa House, 250 Lower High Street, Watford WD1 2AN.
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Check up on the taxman

Barry Woods' program might just get you that income tax rebate . . .

PAYING income tax is no fun at the best of times, but at least with this program you can anticipate how much cash will be left in your pocket next pay day.

Before working out the calculation it needs to know what your tax code is, which tax period your next pay day will be in, how much you've earned, how much tax you've paid on those earnings and how much you expect your next pay to be before any deductions.

Your tax code is issued by the local tax office and is in the form 242L. The actual number can be almost anything but 242 is normal for single people or married women and 383 for married men or others who are claiming a married man's allowance (for instance a single parent).

The letter following the number would normally be L as shown, H or T. None of these letters affects the way in which tax is calculated. Certain other letters however may affect calculation and are outside the scope of this program.

National Insurance calculations in the program are based on a person who pays NI contributions under weekly table A. This will cover all working men and single women who are not classed as self-employed, any working married women who are not entitled to be on B rate and are not self-employed, and in all cases, not contracted out of the State pension scheme and under the current legal retirement age.

The way this program calculates your income tax is to start with your tax code. A tax code of 242 means that you may earn up to £2,425 a year before you need to pay tax at all. This is around £46.50 a week. A married man with a tax code of 383 can earn £3,835 a year, just under £74 a week, without incurring tax liability.

The amount of tax-free pay which you are entitled to for week X is calculated and this figure is deducted from the total wages earned for the current tax year, up to and including the week in which you will receive the amount entered in the input routine.

If your total taxable earnings in any one tax year are less than £17,900 you will be taxed at the rate of 27 per cent. If you exceed that figure, you will have to pay tax at 40 per cent on all taxable pay earned between £17,900 and £20,400.

The rate then increases to 45 per cent for the next £2,500 spread. There are other bands up to 65 per cent and the program caters for these too.

National Insurance is calculated differently. In this case there is a base line and a ceiling. Any earnings below this line, currently £39 a week, attract no contributions up to the maximum amount payable of £25.80 a week irrespective of the amount earned.

For all points in between, the amount due depends on the gross pay for that week. From the base line to £70 the figure is 5 per cent, from £70.01 to the ceiling it is 9 per cent.

Unlike income tax calculations, amounts earned during the year have no effect. If you earn £20 one week and £100 the next, you will pay no NI contribution for the first week and £9 for the second.

Once the tax and NI has been calculated, nett pay is found by subtracting these two amounts from your gross pay.

The bar chart, Figure I, is drawn in Mode 1 and the figures, Tax, NI due, and Nett are shown both as money and as a percentage of your total earning that week.

If you have entered the information incorrectly, or you are due a rebate, the bars may exceed the limit of the screen. This should not be a problem and will leave you secure in the knowlege that you are due a nice fat tax rebate.

The input figures used to obtain the test graph shown were:

Tax code = 233
Pay to date = 0
Tax paid to date = 0
Tax week = 1
Pay due this week = 200

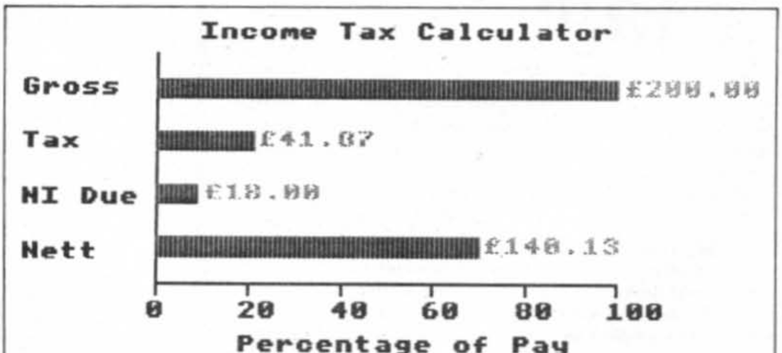

Figure I

VARIABLES

@%	Set to &20205 to format for monetary output.
nett	The money you are left with after deductions.
ni_due	How much NI you have to pay.
pay	Your total earnings to date.
pay_due	What you expect to be paid that week.
taxcode	Your tax code.
tax_to_date	Total amount of tax you have paid that year.
week	Number of the current tax week.

PROCEDURES

enter	Gets information from user.
calc_tax_rate	Calculates the rate of tax payable.
calc_ni_frac	Calculates the amount of NI to pay.
calc_graph	Works out the lengths of the bars on the graph.
draw_graph	Draws the bar graph.

Turn to Page 50 ►

◄ *From Page 49*

```
   10 REM Tax Calculator
   20 REM (c) The Micro User
   30 MODE1:DIM bar(3),money(3)
   40 PRINTSPC10"Income Tax Calculator"
   50 PROCenter:VDU23;8202;0;0;0;
   60 PROCcalc_tax_rate
   70 PROCcalc_ni_frac
   80 PROCcalc_graph
   90 PROCdraw_graph
  100 G=GET:VDU4
  110 END
  120 DEFPROCenter
  130 INPUT"Enter tax code (numbers onl
y) "taxcode
  140 INPUT"Enter pay earned to date "p
ay
  150 INPUT"Enter tax paid to date "tax
_to_date
  160 INPUT"Enter tax week "week
  170 INPUT"Finally enter pay due this
week "pay_due
  180 CLS:ENDPROC
  190 DEFPROCcalc_tax_rate
  200 tax_rate=0.27
  210 IF pay+pay_due>17900 tax_rate=0.4
  220 IF pay+pay_due>20400 tax_rate=0.45
  230 IF pay+pay_due>25400 tax_rate=0.5
  240 IF pay+pay_due>33300 tax_rate=0.55
  250 IF pay+pay_due>41200 tax_rate=0.6
  260 taxfree=(taxcode*10)+5
  270 paytot=pay+pay_due
  280 tax_due=(paytot-((taxfree/52)*week
))*tax_rate
  290 tax_to_pay=(INT((tax_due-tax_to_da
te)*100))/100
  300 ENDPROC
  310 DEFPROCcalc_ni_frac
  320 IF pay_due<39 ni_frac=0
  330 IF pay_due>=39 ni_frac=0.05
  340 IF pay_due>=65 ni_frac=0.07
  350 IF pay_due>=100 ni_frac=0.09
  360 IF pay_due>=295 ni_due=25.65:ENDPR
OC
  370 ni_due=pay_due*ni_frac:ENDPROC
  380 DEFPROCcalc_graph
  390 taxpl=(tax_to_pay/pay_due)*100
  400 nipl=(ni_due/pay_due)*100
  410 nett=pay_due-tax_to_pay-ni_due
  420 bar(3)=750:money(3)=pay_due
  430 taxbar=INT((tax_to_pay/pay_due)*75
0):bar(2)=taxbar:money(2)=tax_to_pay
  440 nibar=INT((ni_due/pay_due)*750):ba
r(1)=nibar:money(1)=ni_due
  450 nettbar=INT((nett/pay_due)*750):ba
r(0)=nettbar:money(0)=nett
  460 ENDPROC
  470 DEFPROCdraw_graph
  480 VDU29,220;312;19,2,2;0;:@%=0
  490 MOVE 0,0:DRAW 0,400:MOVE 0,0:DRAW
750,0
  500 FOR X%=0 TO 750 STEP 150
  510 MOVE X%,0:DRAW X%,-20:VDU5:MOVE X%
-16,-30:PRINTX%/7.5:NEXT:VDU4
  520 PRINTTAB(0,11)"Gross "TAB(0,14)"Ta
x"TAB(0,17)"NI Due"TAB(0,20)"Nett"TAB(11
,25)"Percentage of Pay"TAB(9,8)"Income T
ax Calculator"
  530 Y%=50:FOR N%=0 TO 3:X%=bar(N%):PRO
Cbars:Y%=Y%+92:NEXT:ENDPROC
  540 DEFPROCbars:@%=&20205
  550 MOVE X%,Y%:MOVE X%,Y%+30:GCOL0,2:P
LOT 85,0,Y%:PLOT85,0,Y%+30:GCOL 0,1
  560 MOVE X%+10,Y%+30:VDU5:PRINT"£";mon
ey(N%)
  570 ENDPROC
```

Get it right!

```
 10 =    0 0 | 200 = 3A85 F | 390 = 2818 7
 20 =    0 0 | 210 = 33B9 7 | 400 =  625 9
 30 =  35F F | 220 = 8F69 B | 410 = 44C5 B
 40 = 48B8 8 | 230 = 3B5D E | 420 =  991 A
 50 = C3B1 4 | 240 = 109B 7 | 430 = E317 C
 60 = DDA9 C | 250 = 88E9 C | 440 = FAB9 D
 70 = FF03 B | 260 = 5247 9 | 450 = 1DB0 D
 80 = A1EC C | 270 = C25E 9 | 460 = ED0F 1
 90 = 6375 9 | 280 = 40A1 2 | 470 = 36CD F
100 = ADC9 5 | 290 = BE19 9 | 480 = 8042 1
110 = FD2E 7 | 300 = ED0F 1 | 490 = EE9C 8
120 = DE59 3 | 310 = 289A 0 | 500 = 430C 8
130 = A484 6 | 320 = 770F 2 | 510 = C5AE 6
140 = 2B1D 0 | 330 = FA4D 8 | 520 = 2BF0 9
150 = 378C 7 | 340 = F98F 1 | 530 = 33E5 1
160 = 8B65 7 | 350 = 6E90 2 | 540 = BF3E 4
170 = 9612 7 | 360 = FD78 B | 550 = 920E D
180 = 9234 C | 370 = 71FC 8 | 560 = BE1F 2
190 = FF33 E | 380 = F454 5 | 570 = ED0F 8
```

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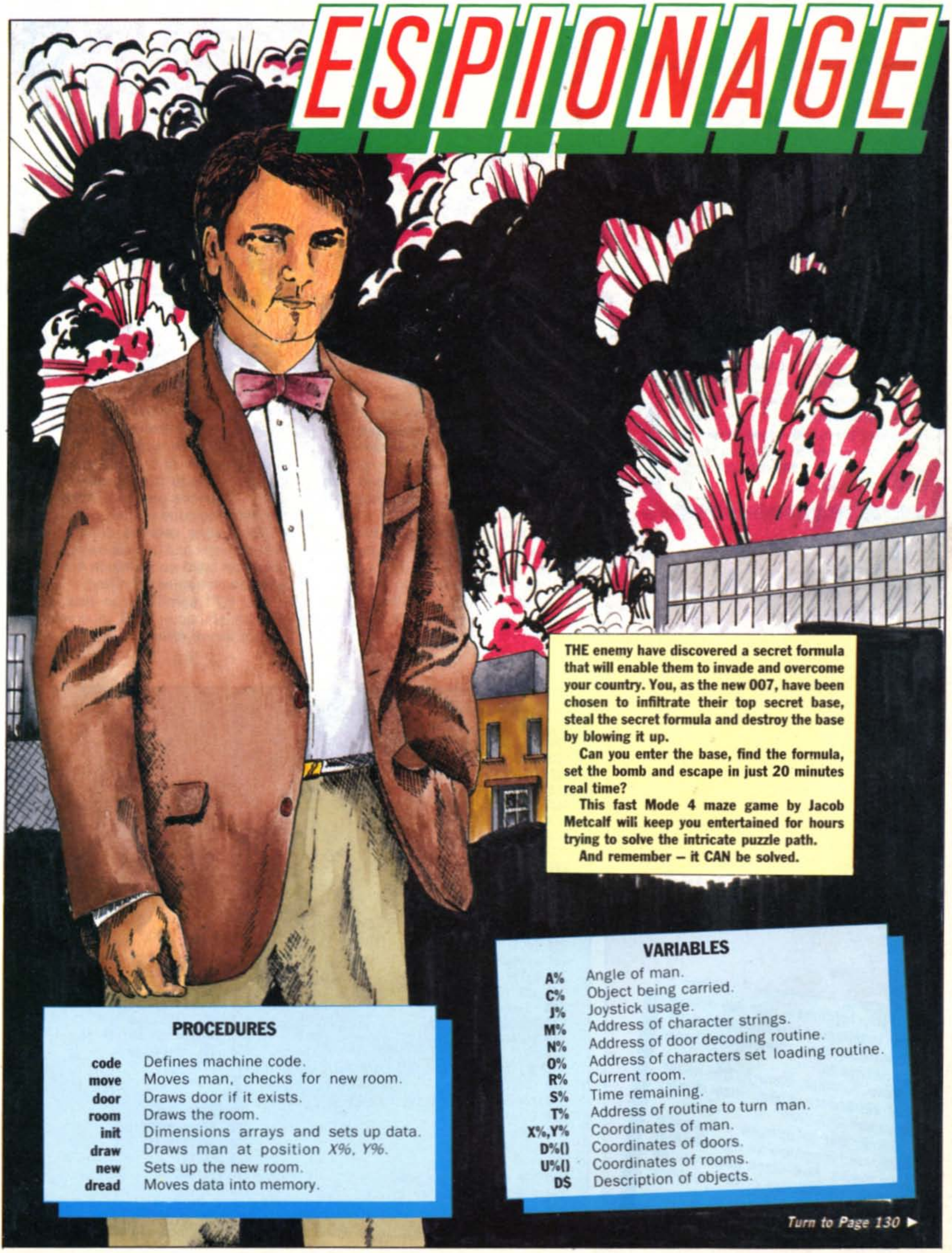

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VARIABLES

A%	Angle of man.
C%	Object being carried.
J%	Joystick usage.
M%	Address of character strings.
N%	Address of door decoding routine.
O%	Address of characters set loading routine.
R%	Current room.
S%	Time remaining.
T%	Address of routine to turn man.
X%,Y%	Coordinates of man.
D%()	Coordinates of doors.
U%()	Coordinates of rooms.
D$	Description of objects.

PROCEDURES

code	Defines machine code.
move	Moves man, checks for new room.
door	Draws door if it exists.
room	Draws the room.
init	Dimensions arrays and sets up data.
draw	Draws man at position *X%, Y%*.
new	Sets up the new room.
dread	Moves data into memory.

Turn to Page 130 ►

THE MICRO USER

PROGRAM Library No. 5

Compiled by Steve Turnbull

ONCE again we have an interesting selection of routines: The final (?) answer to the string output problem presented in the March issue of *The Micro User* . . . a fast and versatile Mode 4 screen clear routine allowing any character to be used as the background . . . a roman numeral to decimal converter – does anyone out there have the decimal to roman converter? . . . and finally a PRINT USING modification for BBC Basic.

Send your routines – with full details of the language it is written in and the hardware/software requirements – on disc or tape to:

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Remember to enclose a stamped addressed envelope for the return of your media. Five blank discs will be sent to the authors of any routines published.

Title: Pattern screen fill
Language: 6502 machine code
Author: Jeremy North

Much of the newest software, particularly the graphics packages, use Mode 4 with fancy background patterns. This machine code routine allows screen fill and partial screen fill with a pattern using any character as the base.

To perform a fill you call PROCfill with the character to use and the line number to start the fill at as parameters. To fill (and clear) the whole screen start at line zero. The routine does not take into account hardware screen scrolling.

It works by calculating the start address of the screen at the specified line, setting *X%* and *Y%* to the low and high bytes of this address – *A%* is already set to the character to be used – then the program jumps into the machine code routine.

This routine gets the definition of the character and fills each eight byte character block on the Mode 4 screen with the character definition.

The VDU command in line 250 defines character 255 to create a basket weave effect on screen.

```
100 REM *****************
110 REM * Pattern Fill *
120 REM *****************
130 PROCinitialise
140 MODE4
150 line=31
160 REPEAT
170 PROCfill(&FF,line)
180 line=line-1
190 Z%=INKEY 20
200 UNTIL line<0
210 REPEAT UNTIL GET=32
220 MODE7:END
230 ---
240 DEF PROCinitialise
250 VDU&FF17;&1D88;&5C3E;&C588;&D1E3;
260 screen_base=&5800
270 bytes_line=320
280 DIM code 100
290 osword=&FFF1
300 PROCassemble_code
310 ENDPROC
320 ---
330 DEF PROCfill(A%,L%)
340 LOCAL X%,Y%
350 X%=screen_base+bytes_line*L%
360 Y%=X%DIV&100
370 CALL fill
380 ENDPROC
390 ---
400 DEF PROCassemble_code
410 FOR L%=0 TO 2 STEP 2
420 P%=code:[OPT L%
430 .fill
440  STA character
450  STX screen_pointer+1
460  STY screen_pointer+2
470  LDX #character MOD256
480  LDY #character DIV256
490  LDA #10
500  JSR osword
510 .fill_loop
520  LDY #7
530 .character_loop
540  LDA definition,Y
550 .screen_pointer
560  STA &FFFF,Y
570  DEY
580  BPL character_loop
590  CLC
600  LDA screen_pointer+1
610  ADC #8
620  STA screen_pointer+1
630  BCC fill_loop
640  INC screen_pointer+2
650  BPL fill_loop
660  RTS
670 .character
680  BRK
690 .definition
700  BRK:BRK:BRK:BRK
710  BRK:BRK:BRK:BRK
720 ]:NEXT
730 ENDPROC
740 ---
```

Title: General purpose string output
Language: 6502 machine code
Author: Petra Galloway

In response to the Print Text utility in Library No.1, where a string could not be printed if it contained the end of string marker value, here is the general purpose version which can be used for any code sequence including Mode changes, PLOT commands and so on.

In order to hold and print a string that contains any Ascii or control values, we have to store the address of a string and its length separately. This method is used by Basic in storing string variables.

The strings to be printed are contained in the table from *message0* to *message1*, from *message1* to *message2* and so on, ending in *messagex*.

The length of the string is held in a table called *length_table*, the low byte of the string address is held in *lo_pointer_table* and the high byte of the string address is held in *hi_pointer_table*.

The string is printed by loading the accumulator with the message number (from zero upwards) and jumping into the *output* routine.

The correct address is selected and set up in the zero page location *pointer* and the length of the string is picked up in the *X* register. The *Y* register is used to index into the string to get each character for output and the *X* register is counted down until zero when all the characters of the string have been printed.

In the demonstration program messages 0 to 2 are displayed by the routine *test* (lines 290 to 330), and line 160 shows how the same routine can be called from Basic. When you put the machine code routine into your program you can leave out lines 290 to 330.

Using this system you can have 256 strings of up to 255 characters length each.

```
100 REM ********************
110 REM * GP String Output *
120 REM ********************
130 MODE7
140 PROCinitialise
150 CALL test
160 A%=3:CALL output
170 END
180 ---
190 DEF PROCinitialise
200 DIM code 256
210 oswrch=&FFEE
220 pointer=&70
230 PROCassemble_code
240 ENDPROC
250 ---
260 DEF PROCassemble_code
270 FOR L%=0 TO 2 STEP 2
280 P%=code:[OPT L%
290 .test
300  LDA #0:JSR output
310  LDA #1:JSR output
320  LDA #2:JSR output
330  RTS
340 .output
350  STA pointer
360  TXA:PHA
370  TYA:PHA
380  LDY pointer
390  LDA lo_pointer_table,Y
400  STA pointer
410  LDA hi_pointer_table,Y
420  STA pointer+1
430  LDX length_table,Y
440  BEQ exit
450  LDY #&FF
460 .out_loop
470  INY
480  DEX
490  BEQ exit
500  LDA (pointer),Y
510  JSR oswrch
520  JMP out_loop
530 .exit
540  PLA:TAY
550  PLA:TAX
560  RTS
570 .message0
580  OPT FNequw(&0716) \Mode 7
590  OPT FNequb(130)   \Green
600  OPT FNequs("GP String Output")
610  OPT FNequw(&0D0A)
620 .message1
630  OPT FNequs("by Petra Galloway")
640  OPT FNequw(&0D0A)
650 .message2
660  OPT FNequs("-- ----- --------")
670  OPT FNequw(&0D0A)
680 .message3
690  OPT FNequw(&0A0A)
700  OPT FNequs("This message was call
ed from Basic")
710  OPT FNequw(&0D0A)
720 .messagex
730 .lo_pointer_table
740  OPT FNequb(message0)
750  OPT FNequb(message1)
760  OPT FNequb(message2)
770  OPT FNequb(message3)
780 .hi_pointer_table
790  OPT FNequb(message0 DIV256)
800  OPT FNequb(message1 DIV256)
810  OPT FNequb(message2 DIV256)
820  OPT FNequb(message3 DIV256)
830 .length_table
840  OPT FNequb(message1-message0+1)
850  OPT FNequb(message2-message1+1)
860  OPT FNequb(message3-message2+1)
870  OPT FNequb(messagex-message3+1)
880 ]:NEXT
890 ENDPROC
900 ---
910 DEF FNequb(B%):?P%=B%:P%=P%+1:=L%
920 ---
930 DEF FNequw(W%):!P%=W%:P%=P%+2:=L%
940 ---
950 DEF FNequd(D%):!P%=D%:P%=P%+4:=L%
960 ---
970 DEF FNequs(s$)
980 $P%=s$:P%=P%+LENs$:=L%
990 ---
```

Title: Roman/decimal conversion
Language: Basic I or better
Author: Alastair Harwood

If like me you can never remember how to convert roman numerals to decimal properly, then these routines are for you.

The main routine, FNdecimal, takes a roman numeral string and converts it to a decimal number.

The main problem with roman numerals is that the digits can sometimes be subtracted from the overall total rather than always added, as in standard decimal notation. For example 1900 decimal is represented in roman numerals by:

```
MCM
```

where M is one thousand, and C is one hundred. Having the C before the second M means subtract one hundred from that thousand giving 1900. Whereas:

```
MMC
```

means add the hundred so you get 2100.

The function FNd does the actual calculation while FNval returns the value of a roman digit.

The table shows the values of the various digits:

I	1
V	5
X	10
L	50
C	100
D	500
M	1000
v	5000
x	10000
l	50000
c	100000
d	500000
m	1000000

```
100 REM Roman/Decimal Conversion
110 REM ------------------------
120 READ roman$
130 REPEAT
140 INPUT"Number (roman)",r$
150 PRINT FNdecimal(r$)
160 UNTIL FALSE
170 :
180 DEF FNdecimal(r$)
190 LOCAL L%,R%,S%
200 P%=1:L%=LENr$:=FNd
210 :
220 DEF FNd:LOCAL T%:REPEAT
230 R%=FNval(MID$(r$,P%,1))
240 IF R%<S% S%=R%:T%=T%+FNd ELSEP%=P%
+1:IF R%=S% T%=T%+R% ELSE T%=R%-T%
250 S%=R%:UNTIL P%>L%:=T%
260 :
270 DEF FNval(r$):LOCAL U%,V%
280 V%=INSTR("#"+roman$,r$)
290 IF V%<2 PRINT"Invalid digit!":END
300 U%=10^((V%-2)DIV2)
310 IF V%AND1 U%=U%*5
320 =U%
330 ---
340 DATA IVXLCDMvxlcdm
350 ---
```

THE MICRO USER PROGRAM Library No. 5

Compiled by Steve Turnbull

Title: Number output formatting
Language: Basic I or better
Author: Peter Davy

When I changed from an old TRS-80 to the BBC Micro I really appreciated the new features. But I missed the PRINT USING command, which allowed tables consisting of figures to be printed out with a specified number of decimal places in each column, and with all decimal places in line.

The BBC Micro does allow the way figures are set to be altered by assigning values to the variable @%. But this affects every single number, so while a cost of an item may require two decimal places for the pence, the quantity of items will always be integer but will be printed with a decimal place and two zeroes.

The routine PROCusing allows a number to be printed at a given tab position in the line according to a field image.

The field image is built up from a hash (#) which indicates a digit position and a decimal point (.) which plots the decimal point.

If you are going to have any negative numbers you must include enough hashes for the maximum number of digits plus the minus sign.

It would be nice to be able to have this as a function:

```
PRINTTAB(10)FNusing("###.##",-99.99)
```

But unfortunately BBC Basic doesn't seem to appreciate the cleverness of this technique because it persists in using the setting for @% that applies when the PRINT statement is begun. Even omitting the LOCAL @% statement doesn't solve the problem, so we'll just have to put up with a PROC.

```
  100 REM PROCusing Demonstration
  110 REM ---------------------
  120 MODE3
  130 PRINTTAB(3)"X"TAB(8)"Y"TAB(12)"ABS
(X-Y)"TAB(22)"X/Y"TAB(32)"Y/X"TAB(41)"1/
X"TAB(51)"1/Y"TAB(58)"(X+Y)/ABS(X-Y)"
  140 FOR I%=1 TO 20
  150 REPEAT X%=RND(500)
  160 Y%=RND(500):UNTIL X%<>Y%
  170 IF RND(10)=1 X%=-X%
  180 IF RND(10)=1 Y%=-Y%
  190 PROCusing("####",1,X%)
  200 PROCusing("####",6,Y%)
  210 PROCusing("###",14,ABS(X%-Y%))
  220 PROCusing("####.####",18,X%/Y%)
  230 PROCusing("####.####",28,Y%/X%)
  240 PROCusing("##.#####",39,1/X%)
  250 PROCusing("##.#####",49,1/Y%)
  260 PROCusing("###.###",60,(X%+Y%)/ABS
(X%-Y%))
  270 PRINT:NEXT:END
  290 DEF PROCusing(image$,tab,value)
  300 LOCAL @%,field,places
  310 field=LEN(image$)
  320 IF INSTR(image$,".")=0 places=0 EL
SE places=field-INSTR(image$,".")
  330 IF places>0 @%=131072+256*places+f
ield ELSE @%=field:value=INT(value+.5)
  340 PRINTTAB(tab)value;
  350 ENDPROC
```

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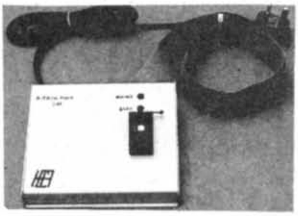

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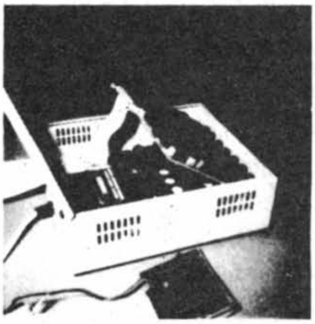

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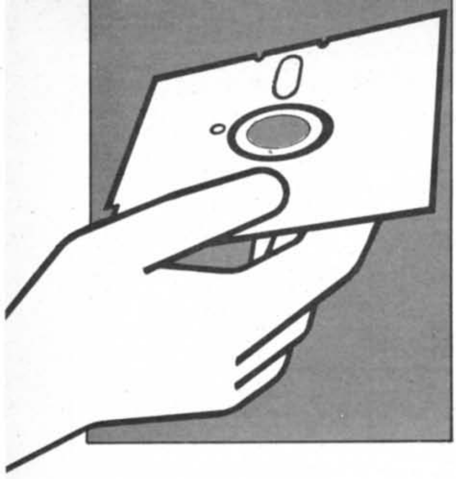

Deft hand with gobbledegook

Andrew Thomson offers a disc-based data encryption utility

WRITING utilities that run from disc needs special skills. To show you how to get started let's create a data encryption program – one that will read any file, turn it into gibberish, and write it back to disc.

This won't stop other people from looking at your file, or trying to run it, but it will mean nothing until you want to convert it back.

And by following the same techniques you will be able to put all your utilities on a disc and access them easily.

Like all disc utilities we want to be able to invoke ENCRYPT in the same way as any other DFS command – by preceding its name with a * and following it with the parameters, so it can take any one of the following forms:

```
*ENCRYPT
*ENCRYPT infile
*ENCRYPT infile outfile
*ENCRYPT infile outfile codeword
*ENCRYPT infile outfile codeword Y
*ENCRYPT infile outfile codeword N
```

Using the standard notation this can be explained in one line:

```
*ENCRYPT ( <INFILE> ( <OUTFILE> (
  <CODEWORD> (Y/N) ) ) )
```

Most commercial utilities are written entirely in assembly language, which is fine if you are good at it and have a lot of time to spare.

But for most of us it's much more convenient to write in Basic, with sections of assembly language.

So first, let's write a short routine to allow us to *RUN any Basic program from a disc, and enable it to access parameters on the command line following the star command, for example:

```
*SCAN text-A text-B
```

where SCAN is some Basic utility program and the two following parameters, text-A and text-B, are two files.

Type in Listing 1 and save it as Basparam. When this program is RUN it creates a short piece of relocatable machine code called Params.

When this is combined with a Basic utility program and the combination *RUN, the machine code routine collects the rest of the command line (if any) and saves it for later use, then RUNs the Basic utility program.

```
100 REM ** Basparam **
110 REM by A.Thomson
120 REM (C) Micro User
130 REM Load "Params" to TOP
140 REM Save program from PAGE
150 REM to TOP+&62, execution
160 REM address is TOP.
170 REM
180 osbyte=&FFF4:osword=&FFF1
190 oswrch=&FFEE:osargs=&FFDA
200 store=&70:cmdln=&74
210 databyte=&78
220 FOR L%=0 TO 3 STEP 3
230 P%=&3000
240 [OPT L%:.start
250 \flush keyboard buffer
260 LDA #21:LDX #0:JSR osbyte
270 LDA #138
280 LDY #ASC"O":JSR osbyte
290 LDY #ASC"L":JSR osbyte
300 LDY #ASC"D":JSR osbyte
310 LDY #13:JSR osbyte
320 LDY #ASC"R":JSR osbyte
330 LDY #ASC"U":JSR osbyte
340 LDY #ASC"N":JSR osbyte
350 LDY #13:JSR osbyte
360 \Set up pointer to string
370 \parameter store on stack
380 LDA #&01:STA store+1
390 LDY #&00:STY store
400 \Find rest of command line
410 LDX #cmdln:LDA #1:JSR osargs
420 \Get the command line
430 .getloop
440 \Read the next byte
450 LDA #5:LDX #cmdln:JSR osword
460 \increment line pointer
470 INC cmdln:BNE no-carry1
480 INC cmdln+1:.no-carry1
490 \Get line byte and save it
500 LDA databyte:LDY #0
510 STA (store),Y
520 \increment store pointer
530 INC store:BNE no-carry2
540 INC store+1:.no-carry2
550 \Check for end of line
560 CMP #13:BNE getloop
570 \switch off screen & return
580 LDA #21:JMP oswrch
590 ]:NEXT
600 *SAVE params 3000+62
```

Listing 1

Now how do we get at the rest of the command line?

Diving into the User Guide reveals that a call to the filing system command osargs, with A equal to 1, Y equal to 0 and X set to the address of a four byte block in page zero, will return the address of the rest of the command line in the four byte block.

Then we use calls to osword 5 (read I/O processor memory) to copy the parameters in the command line supplied into memory page 1 – the hardware stack page.

This page was chosen because it is the only place we can be sure will be free in both the I/O processor and the second processor, because very little stack space is ever used.

Once this is done the machine code routine fools the Basic interpreter into RUNning the utility program by clearing the keyboard buffer and inserting OLD and RUN into it.

This has exactly the same effect as if OLD and RUN had been typed in at the keyboard and is achieved with calls to osbyte 138. As an example, try:

```
*FX 138, 0, 65
```

This inserts Ascii code 65 into the keyboard buffer.

Finally we prevent the OLD and RUN from appearing on the screen by sending Ascii code 21 to the VDU drivers to switch them off.

However, make sure all your programs have a VDU6 command right at the start to switch them on again or your program's screen output will not appear.

To test the routine, first run Basparam to create and save the program Params, then type NEW and enter this short program:

```
10 VDU 6
20 FOR X%=1 TO 10
30 PRINT X%
40 NEXT
50 PRINT $&100
```

All this does is switch the screen back on, print the numbers from one to ten then print out the memory where the parameters have been stored to check they have been passed correctly.

Find its start address, <page>, its top address, <top>, together with a third value we'll call <end> in hexadecimal form:

```
PRINT ~TOP
PRINT ~PAGE
PRINT ~TOP+&100
```

Then type in the following commands, filling in the numbers for <top>, <page> and <end>:

```
*LOAD Params <top>
*SAVE One-ten <page> <end> <top>
```

Now try running one-ten using a star command. As a test we'll use four parameters "The test has worked!", so disc users enter:

```
*one-ten The test has worked!
```

Or, if you are using a cassette system, type:

```
*RUN one-ten The test has worked!
```

You should get the numbers from one to ten printed, and then the line "The test has worked!". If not go back and check the various programs.

In the main program – Listing III – there are several tasks to perform. It must sort out the parameters at &100, open the appropriate files for input and output, encrypt the data and delete the input file if required.

Getting the parameters involves string handling for the parameters put at &100 and keyboard/screen handling for any parameters missed off the command line and Basic is best suited to this.

For each parameter required by the utility program we call the function at line 290 to get the next parameter from the string stored at &100.

If there are no more parameters the function returns the empty string, "", see line 310.

Each time the empty string is returned the program must prompt for the string to be entered from the keyboard, using the function at line 360.

In the case of the codeword the screen is switched off so that nothing appears as you type the word in and the program will not go any further until you have typed a codeword in.

Each of the strings is transferred to memory in a block of bytes. And one byte in zero page is used to indicate whether the original file should be deleted.

In the assembly language part if either file cannot be opened an error is generated and the message displayed, see lines 600 and 680.

Now for the data encryption. This can be achieved in many different ways, some more effective than others.

But the Exclusive Or method is effective for most purposes and simple to implement. It requires a codeword, such as UNUSUAL-WORD!, which is repeatedly EORed character by character with the data.

For example, if we take some test data

```
  100 REM *   Demonstration of   *
  110 REM * Encryption using EOR *
  120 REM *  (C) The Micro User  *
  130 MODE 7
  140 DIM C% &100,T% &100
  150 INPUT"Codeword",$C%
  160 IF LEN$C%=0 THEN RUN
  170 INPUT"Text to code",$T%
  180 PRINT"Text Binary  Code Binary  E
or Binary"
  190 VDU28,0,24,39,5:P%=0
  200 FOR L%=0 TO LEN$T%-1
  210 W%=T%?L%:X%=C%?P%
  220 PRINTSPC2FNc(W%);
  230 PRINTSPC3FNc(X%);
  240 PRINTSPC3FNc(W%EORX%)
  250 P%=P%+1:IF P%=LEN$C% P%=0
  260 NEXT:PRINT'SPC4"Again? (y/n)";
  270 REPEAT G%=INSTR("YyNn",GET$)
  280 UNTIL G%>0:IF G%<3 THEN RUN
  290 END
  310 DEFFNc(V%):LOCAL a$
  320 IF V%>32 IF V%<127 a$=CHR$V% ELSE
a$=" "
  330 =a$+" "+FNb(V%)
  350 DEFFNb(B%)
  360 LOCAL b$,c$,Z%
  370 FOR Z%=0 TO 7:c$="0"
  380 IF B% AND 2↑Z% c$="1"
  390 b$=c$+b$:NEXT:=b$
```

Listing II

and a codeword such as:

```
THIS-IS-SOME-TEST-DATA
UNUSUAL-WORD!UNUSUAL-W
```

The Ascii value of T is EORed with the Ascii value of U, H with N and so on, with the codeword being repeated as often as necessary.

The longer and more random the codeword is the better – but you have to remember what it is. Type in and run Listing II for a demonstration of how this works.

The actual routine for conversion is written in assembly language for speed and simplicity. To encrypt a file it is opened together with the file to write the results to.

Each character is read in with osbget and EORed with the next character from the codeword. The pointer to the codeword is updated and the encrypted byte is written to the new file using osbput.

This continues until the end of the file is reached and the files are closed.

When a file is opened for output and then closed the load and execution addresses are set to zero because the DFS has no information as to what they should be.

This is easily remedied by reading in the catalogue information from the original input file and writing the information out to the encrypted output file. To read the catalogue information of a file simply needs the file's name and a block of memory 18 bytes long in which to store its load address, execution address and file attributes (whether locked or not).

The address of the input file name is placed at the start of the data block and osfile 5, read catalogue information, is performed. Then the address of the output file name is put into the data block and osfile 1, write catalogue information, is performed.

Deleting the file using machine code is quite straightforward. First make sure that the input file is unlocked by using the same data block as before.

Copy the address of the file name to the parameter block, set the file attributes to zero to unlock and use osfile 4 to write the new attributes only. The file is then easily deleted using osfile 6, with the same data block.

The complete encryption program is given in Listing III. Type it in and save it as B.ENCRYPT.

Add the machine code program Params to this listing as before and save the new program as ENCRYPT. You will now be able to run it with the command *ENCRYPT followed by the parameters previously described.

This utility can be used to protect any type of file – but be careful that you don't forget the codeword for each file, otherwise you may never get it back.

Using similar techniques to the ones described in this article you should be able to write your own disc-based utilities, access them with star commands and pass any number of parameters into them.

Don't forget, if you have any useful utilities send them to us – but please don't encrypt them first.

```
  100 REM Encrypt
  110 REM by A.R.Thomson 1986
  120 REM (C) The Micro User
  130 VDU 6:REM Turn on screen
  140 DIM code &100,crypt &100
  150 DIM src &100,dst &100
  160 parm=&100:REM hardware stack page
  170 PROCassemble
  180 $src=FNgetparam
  190 IF $src="" $src=FNinput("Input fil
e",FALSE)
  200 $dst=FNgetparam
  210 IF $dst="" $dst=FNinput("Output fi
le",FALSE)
  220 $crypt=FNgetparam
  230 IF $crypt="" $crypt=FNinput("Code
word?",TRUE)
  240 yn$=CHR$ASCFNgetparam
  250 IF yn$="" yn$=FNinput("Delete inpu
t file",FALSE)
  260 ?delete=INSTR("NnYy",yn$)>2
  270 CALL code:END
  280 ---
  290 DEF FNgetparam
  300 IF ?parm=32 REPEAT $parm=$(parm+1)
:UNTIL ?parm<>32
  310 LOCAL s$:IF ?parm=13 =""
  320 REPEAT s$=s$+CHR$?parm
  330 $parm=$(parm+1)
  340 UNTIL ?parm=13 OR ?parm=32:=s$
```

Listing III

◄ From Page 59

```
  350 ---
  360 DEF FNinput(t$,T%)
  370 LOCAL s$,X%,Y%
  380 PRINT t$;:X%=POS:Y%=VPOS
  390 IF T% VDU21
  400 REPEAT
  410 INPUTTAB(X%,Y%)s$
  420 UNTIL s$>"
  430 IF T% VDU6
  440 =s$
  450 ---
  460 DEF PROCassemble
  470 osfind=&FFCE:osargs=&FFDA
  480 osfile=&FFDD:osbget=&FFD7
  490 osbput=&FFD4:delete=&75
  500 f-src=&76:f-dst=&77
  510 p-crypt=&78:databyte=&79
  520 params=&7A
  530 FOR L%=0 TO 2 STEP 2
  540 P%=code:[OPT L%
  550 \Open source file read only
  560 LDX #src MOD256
  570 LDY #src DIV256
  580 LDA #&40:JSR osfind
  590 STA f-src:TAY:BNE okay1
  600 OPT FNerror(129,"Can't find source
 file")
  610 .okay1
  620 \Open destination file
  630 \write only
  640 LDX #dst MOD256
  650 LDY #dst DIV256
  660 LDA #&80:JSR osfind
  670 STA f-dst:TAY:BNE okay2
  680 OPT FNerror(129,"Can't find destin
ation file")
  690 .okay2
  700 \Initialise pointer to
  710 \encryption code word
  720 LDY #0:STY p-crypt
  730 .loop
  740 \get the next byte or exit
  750 LDY f-src:JSR osbget:BCS eof
  760 STA databyte
  770 \get next encryption byte
  780 LDY p-crypt:LDA crypt,Y
  790 CMP #&0D:BNE loop2
  800 \reached end so restart
  810 LDY #0:LDA crypt,Y
  820 .loop2
  830 \Increment pointer and save
  840 INY:STY p-crypt
  850 \encrypt data byte and save
  860 EOR databyte:LDY f-dst
  870 JSR osbput:JMP loop
  880 .eof
  890 \Close source file
  900 LDA #0:JSR osfind
  910 \Close destination file
  920 LDY f-dst:JSR osfind
  930 \Set up read catalogue info
  940 LDX #params MOD256
  950 LDY #params DIV256
  960 LDA #src MOD256:STA params
  970 LDA #src DIV256:STA params+1
  980 LDA #5:JSR osfile
  990 \Change to destination file
 1000 \and write the same info
 1010 LDA #dst MOD256:STA params
 1020 LDA #dst DIV256:STA params+1
 1030 LDA #1:JSR osfile
 1040 \Now check for deleting
 1050 LDA delete:BEQ exit
 1060 LDA #src MOD256:STA params
 1070 LDA #src DIV256:STA params+1
 1080 \Unlock file and delete
 1090 LDA #0:STA params+14
 1100 LDA #4:JSR osfile
 1110 LDA #6:JSR osfile
 1120 .exit RTS:]:NEXT:ENDPROC
 1130 ---
 1140 DEF FNerror(E%,E$):[OPT L%
 1150 BRK:OPT FNequb(E%)
 1160 OPT FNequs(E$):BRK:]:=L%
 1170 ---
 1180 DEF FNequb(B%):?P%=B%
 1190 P%=P%+1:=L%
 1200 ---
 1210 DEF FNequs(S$):$P%=S$
 1220 P%=P%+LENS$:=L%
 1230 ---
```

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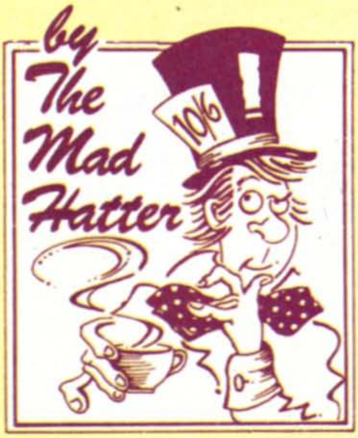


Gem with a touch of Wonderland

VERY occasionally I come across an adventure which escaped my notice when it first appeared on the market and find a real gem. Programmers Revenge, by Colisoft is one of those rarities. At £11.95, which is a little steep for a tape-based game these days, it is still first class value for money.

Its basis is the usual task of collecting treasures, but there are some most unusual and interesting twists to the various scenarios. An added bonus is that, from time to time, there are some well designed Mode 7 illustrations.

The instructions are clear, your input is in a contrasting colour from the scene description, and inappropriate entries are met with a polite "I beg your pardon?"

Where an object needs to be manipulated, you have to be precise as you enter instructions.

I'm not giving away vital secrets if I tell you that, in the early moves of the game, *break panel* produces the response "You must say how".

Programmers Revenge has that highly desirable easy start which allows you to become involved very quickly in simple but logical puzzles, and one treasure can be found easily.

After that, though, the difficulty escalates steadily. The puzzles are logical and challenging and there are some deft touches of humour.

I enjoyed the fact that there is a scene reminiscent of Alice in Wonderland (I would, wouldn't I?), and also the fact that time travel is available.

I think that Colin Jack must have watched a certain April Fools' Day television broadcast – there is a spaghetti tree in the orchard. Shaking trees in the orchard produces a variety of results, from the profitable to the painful.

The garden and orchard area require careful mapping, and are the prelude to a truly horrendous maze in the rose garden. I was very glad to have had help here.

If any reader has not tried adventures, but enjoys crossword puzzles, this could be just the game to introduce you to the intellectual delights of an adventure full of brain teasers. A hint sheet and sensible backup help is available on request.

Helpline

Lt.Col.J.P.Munnery has signalled a problem in ***Hampstead*** – he can't prise open the cabinet in his office. He needs the screwdriver that can be found in the desk in the furniture department of the store.

Richard Knowles asked for help at the beginning of ***Kayleth*** just as Nick Cregan wrote in with clues. The following should help you, Richard.

Break bands, get off, U, pull lever, D, examine machinery, take tape, N, take fuse, E, E, examine chair, turn knob, take and wear gloves, S, examine filing cabinet, take micro cannister, open tape, put tape on micro cannister.

Once the cannister has dissolved, W into service take cartridges, W into service corridor, insert a cartridge, examine aperture and go out. Once outside the ship, examine the door for the first azap code.

Sean Marsh can't find the pepper in ***Bored of the Rings***. Just past the signpost on the great east road beyond the Puny Prancer is an unflagged exit N to the mountains; go UP to find the pepper. When typing in the passwords it is essential to begin with a capital letter.

Roger White (who narrowly escaped having to teach me philosophy) offers enlightenment to Mark Hilton over the talisman in ***Kingdom of Hamil***.

The whole point of the talisman is that you can't keep hold of it. But because you have to keep the talisman while in the maize field, you need to find a way back to the location you have just come from at every stage of the maze.

As Roger says, this provides a puzzle which is an elegant variation on the traditional maze.

Problem Corner

Todd Newman has problems in the following adventures: **Dennis through the Drinking Glass:** How do you get out of the French model's flat? Also, in **Classic Adventure:** Where are the dynamite sticks?

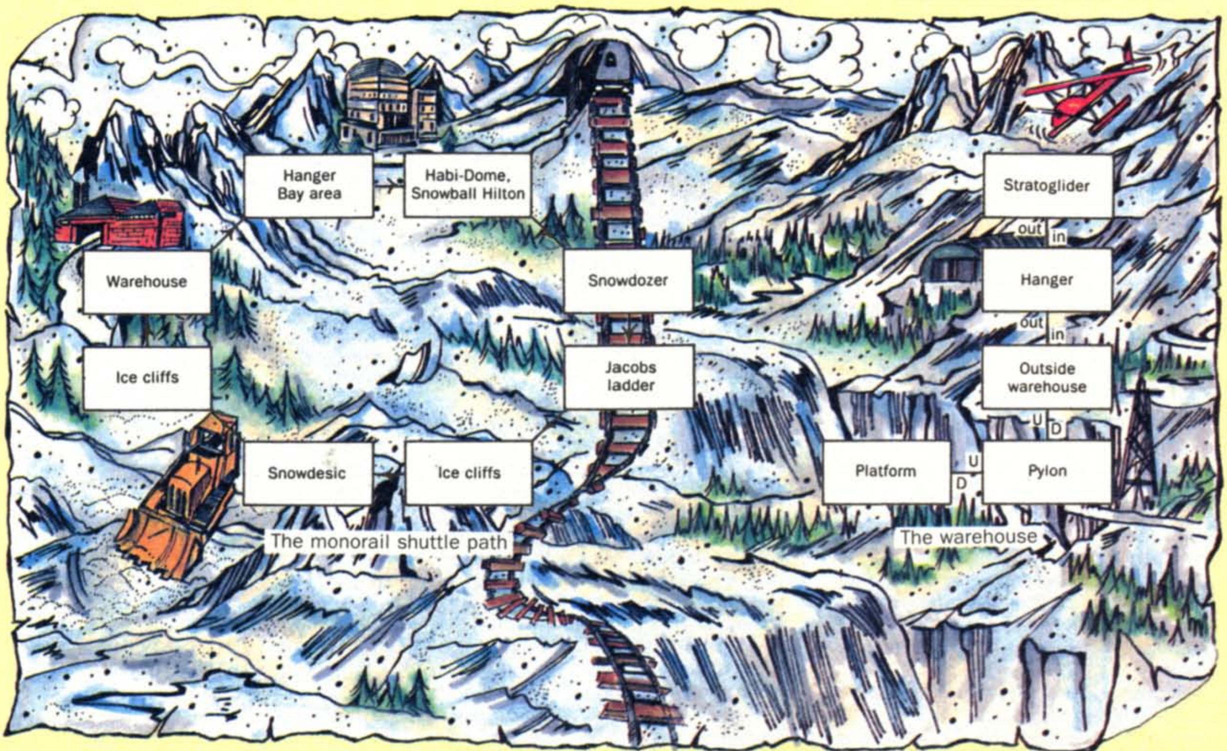
In **Fantastic Four** (tape version): How do you get rid of Xardu? In **Old Father Time:** How do you get out of the room with no exits and the bright light from the hole in the wall?

He can't get out of the classroom area after being sent to the headmaster's office in **Wizard's Challenge**, (neither can Paul Whatley).

Todd can't pass the glass wall in **Katacombs** and wonders if anything can be done at the chasm.

Finally, in **Xanadu Cottage**, he'd like to cross the sea without drowning and in **Ebony Tower** he would like to buy the carpet if someone can tell him where the necessary means can be found.

Sean Marsh needs help in **Castle Frankenstein:** How does he get the key to the back door from next to the waterfall?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in
Warehouse
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Hanger
out
in
Ice cliffs
Jacobs ladder
Outside warehouse
U
D
Snowdesic
Ice cliffs
Platform
U
D
Pylon
The monorail shuttle path
The warehouse

Part III of the Snowball map

Colin Jack is preparing another illustrated adventure called Oxbridge. I hope to review it shortly: If it is up to this standard, he'll have another winner.

Turning to the question of larger adventures, Calvin Butcher agrees with Sheila Thomas that there is a dearth of decent sized ones for Master owners, and suggests a letter campaign to people like Infocom. What about it? Send your opinion to the Letters page.

I am grateful to Jonathan Morris for the solution to Ravenskull and at the same time, can someone help Colin and Robert Boltman with Citadel: They can't pass the witch or the floating ball on the other side of the temple on the island.

It is difficult to decide whether Hacman or I should deal with games such like these – after all are they arcade or adventure?

Pedro Leonardo, who lives in France, has sent me a fascinating letter on a possible bug in the Moria section of Lord of the Rings.

It arrived in the same post as Richard Entwistle's letter on solving the Mines of Moria, so it seems sensible to include extracts from both.

Pedro Leonardo tells me that he arrived at the Gate of Moria, used the correct password to open the gate, went east and his BBC Micro promptly hung up.

Next time he tried waiting around a little after opening the door only to find that Gandalf, true to his impetuous nature, rushed in without him.

He naturally typed "Follow Gandalf", and the program crashed.

Pedro then started to get clever. He opened the door again, typed "Say to Sam 'Go East'" followed by "Become Sam".

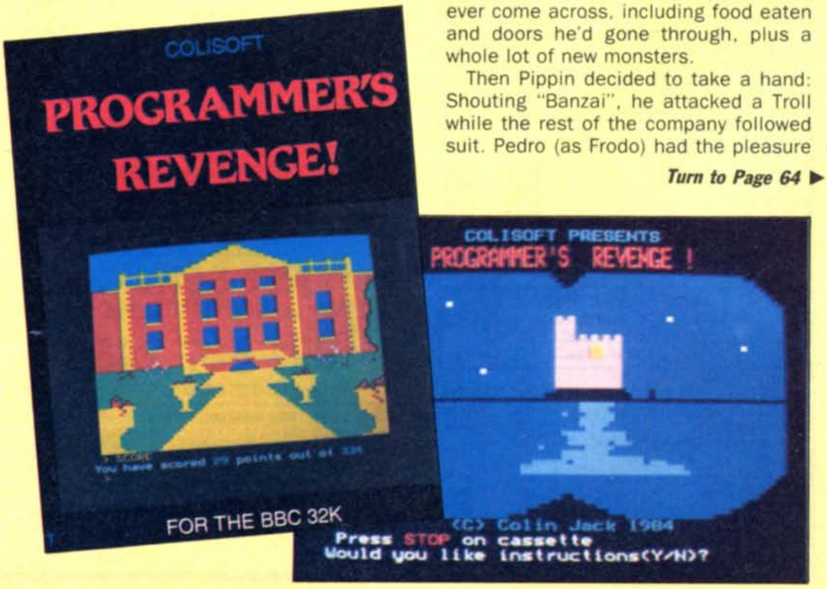
The program fought back by failing to give a description of the location. Instead it congratulated him on completing part 2A and prompted him to save his position. Pedro obligingly did so.

After loading in part 2B together with the saved section, Pedro chose the characters he wanted to use and got the chilling message: "You are in nowhere".

At this point things began to get a little difficult. In quick succession he was confronted with every object he had ever come across, including food eaten and doors he'd gone through, plus a whole lot of new monsters.

Then Pippin decided to take a hand: Shouting "Banzai", he attacked a Troll while the rest of the company followed suit. Pedro (as Frodo) had the pleasure

Turn to Page 64 ▶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Would you like instructions(Y/N)?
```

◄ From Page 63

of being killed by the balrog.

Readers who know the book will recognise this scenario, it's Moria gone mad. Is there any rational explanation we can offer Pedro?

Richard, who survived the Moria experience, gives the following tips:

You must have Gandalf to enter safely; then, from the bottom of the stairs it is U, E, E, E to the bare room. Next go D, W, D, S, D to the stone corridor. If you then accept the invitation to go U, the way back is D, W, S, D.

Once in the stone corridor put out the candle and get Gandalf to break the stone door. Next go E, E, E, U, E, E, E to the next maze. Here you go S, D, S, S and after that Richard says it is plain sailing.

A final thought from Pedro: Try typing "Say to Sam, Merry and Pippin (whatever you like)". He says it's great fun after waiting 10 minutes for the program to load.

● *See you next month. Until then, happy adventuring.*

Hall of Fame

IAN Rainey of Bangor provided the following solution to **Castle Quest**. First go up the ladder on your right, go left at the top and along to the next ladder. Jump the gap at the top of this ladder and go up the other ladders to collect the ruby.

Next, return to the starting level and go right to the Troll's bridge. Start to cross, and as the Troll emerges drop the ruby. When the Troll has taken it to his lair, run across the bridge, through the wall and up the next ladder.

Jump all the gaps until you reach two parallel ladders: To cross them, get to the edge of each one, press right and jump. Collect the first torch and then make your way back and collect the gold bar. Practice getting on to the ladder will come in useful later.

Return to the Troll, this time using the gold bar as bait. Now go back to where you collected the ruby and take the second torch. Then go to the starting level and get the remaining torch.

Descend the ladders to the bottom of the screen and block off the bottom of the far left and far right ladders with torches.

If you climb the middle ladder and and stand at the right hand side you can catch all the red men.

Collect the torch you put at the bottom of the right ladder and leave it slightly to the left of the middle ladder. The torch at the top of the middle ladder should now be placed on top of the left ladder.

Now remove the torch at the bottom of the left ladder so that the red men will run into the spiders' area. Quickly follow the first red man, collect the sword and run out. Leave all the torches where they are for later use.

To be continued.

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'Plotter' is too simple a word to describe PLOTMATE. It is, in effect, a highly sophisticated data communications device that greatly extends a micro system's options and capabilities allowing high resolution input and high definition output. It is compatible with all leading micros including the BBC, IBM, AMSTRAD, ATARI and NIMBUS.

PLOTMATE A3M with Linear Graphics' high resolution image scanner — LINSCAN.

NEW RELEASES

HPGL By expanding the on-board graphics language range PLOTMATE understands commands from HPGL 7475A/7470A industry standard languages enabling compatibility with BITSTICK, AUTOCAD, LOTUS 123, SUPERCALC 3, CHARTMASTER and many others.

IMAGE SCANNING PLOTMATE's flexibility is further extended by the use of Linear Graphics' own scanner, LINSCAN. This allows PLOTMATE to function as a sophisticated image scanner producing high resolution pictures that can be used within desktop publishing packages such as Pagemaker, GEM, Fleet Street Editor and Image.

EXTENDED GRAPHICS COMMANDS The in-built graphics commands of the BBC micro that PLOTMATE understands now encompass the extended graphics commands of the BBC Master such as circle and arc drawing, sector and segment filling, rectangle and parallelogram shading.

DOMESDAY All 'Welcome' disks allow data files produced by the DOMESDAY database to be output in pie, bar and line chart format on the BBC Master.

Not content with providing this wealth of technical capacity Linear Graphics have even introduced a unique discount scheme for education — the 'Educational Support Scheme.'

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MU7

EDUCATION NEWS

Transparent interface launched

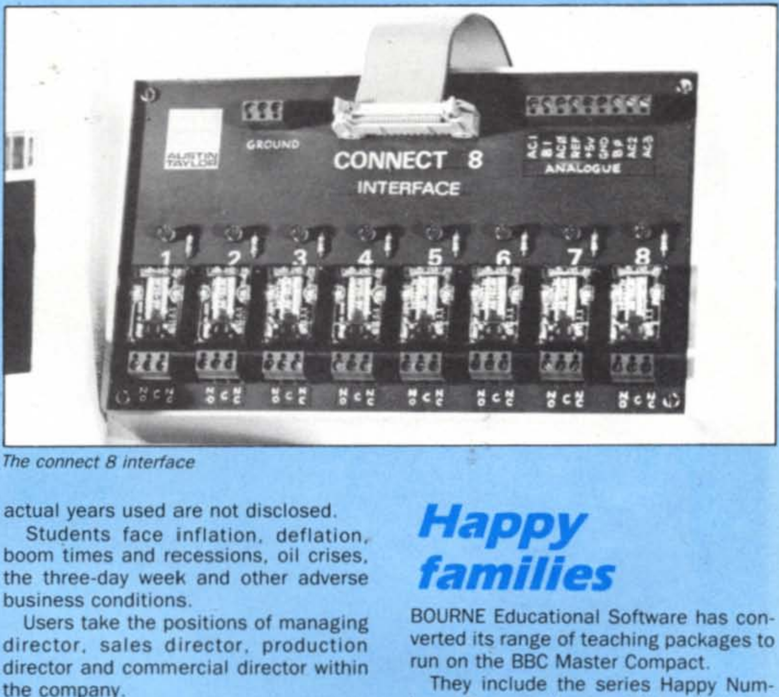
UNLIKE the "black box" variety of interfaces currently available, Connect 8 from Austin Taylor hides as little as possible from the user.

Relays are mounted in plain view and can be seen operating when the device is connected to the 1MHz Bus and analogue ports of a BBC Micro. It takes its power from the host machine.

Eight outputs are provided by single pole changeover relays with status LEDs.

The software provided monitors the inputs, controls the outputs and displays the status of both on-screen at all times. It is completely user-accessible, allowing customisation to a large number of individual applications.

Connect 8 for the BBC Micro costs £96 from Austin Taylor (0248 600561).



The connect 8 interface

Expanding horizons

A GROUP of lecturers and teachers are publishing a new education resource for their colleagues working with sixth formers and university students.

Information Education Ltd (0782 281643) is producing Viewbooks, text and reference books.

They are aimed at teachers and students of subjects not normally associated with computer technology.

More than 20 titles are available for the BBC Micro, costing £15 for one or two discs and the authority to make 20 copies.

Single keystrokes enable page turning, searches and other operations including the facility to print out sections.

Concrete success

FOLLOWING its success with The Cement Game, System Software has released a second business simulation for sixth formers and above.

Crisis Management involves running a company for five consecutive years taken from the period 1961-85. The actual years used are not disclosed.

Students face inflation, deflation, boom times and recessions, oil crises, the three-day week and other adverse business conditions.

Users take the positions of managing director, sales director, production director and commercial director within the company.

Quarter by quarter within the five years, they are responsible for cashflow, profitability, production, investment, labour and wages. Too many bad decisions, and bankruptcy results.

Crisis Management is available for the BBC Micro and Master Compact from System Software (0742 682321) price £60, Econet version £120.

Digging up the past

The first in a series of simulations designed to be used by junior school pupils as part of integrated work projects has been released by Magnolia Soft.

Rompton Combe recreates on a BBC Micro the excavation of a Roman fort and villa, with maps and graphic displays for each level of the dig. The program is expandable, allowing teachers to add their own resource materials and even create their own simulations.

Rompton Combe from Magnolia Soft (0392 213724) costs £10.95 on disc.

Happy families

BOURNE Educational Software has converted its range of teaching packages to run on the BBC Master Compact.

They include the series Happy Numbers, Happy Letters and Happy Writing, guessing games Animal/Vegetable/Mineral and Worldwise, and traditional spelling game Wordhang.

All Compact versions are available from Bourne Educational Software (0794 523301) priced £16.95 each.

Heavy metal

THE Institute of Metals, professional body for metallurgy and materials engineering, has launched a software series aimed primarily at students in universities and colleges of further education.

It deals with materials engineering and comes on discs compatible with the BBC series of micros.

Each of the 10 discs in the series contains up to six modules covering different aspects of the subject area. Two further discs, dealing with electron microscopy, are due for release soon.

Details from Dr J F Humphreys, Department of Metallurgy and Materials Science, Imperial College (01-589 5111).

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The 1987 ACORN USER Exhibition is the premier show in the UK devoted to all aspects of buying, using and getting the most out of your BBC computer. You will have the unique opportunity of being able to review the latest hardware and software innovations whether you are an educational, business or home-user.

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Subjects to be covered will include: Education software, business software, programming, monitors, printers, peripherals, music, publishing and graphics.

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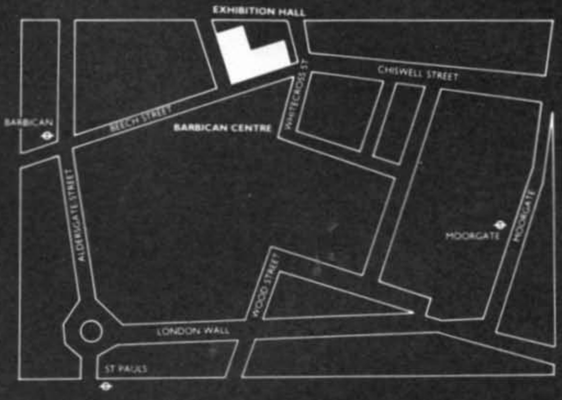
Before July 9th, advance tickets will be available at the specially reduced price of £2.00. Use the coupon at the bottom of this advertisement. Alternatively, ring Stephen Harvey on the 1987 ACORN USER Exhibition hotline – 01 836 2441 ext. 275 and quote your Access or Barclaycard number.



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Fri 24th	– 10 .00 to 18.00 hrs	
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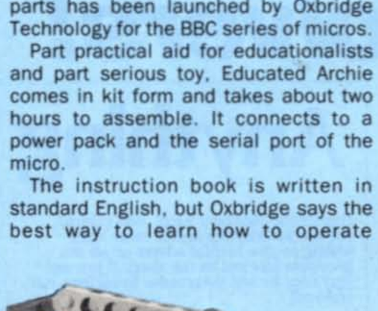
EDUCATION NEWS

Educating Archie

A NEW mini-robot which emulates its more sophisticated industrial counterparts has been launched by Oxbridge Technology for the BBC series of micros.

Part practical aid for educationalists and part serious toy, Educated Archie comes in kit form and takes about two hours to assemble. It connects to a power pack and the serial port of the micro.

The instruction book is written in standard English, but Oxbridge says the best way to learn how to operate Educated Archie is through the accompanying software. Options appearing on-screen in separate windows guide the user through different sequences.



Archie mini-robot

Educated Archie works on exactly the same principles as industrial robots, replicating the scope of movement, ability to pick up and place objects, and hold and use tools.

The manipulative arm has wrist and elbow joints and a sensitive gripper which can hold objects up to 250 gms in weight.

Educated Archie is available direct from Oxbridge Technology (0908 314626) price £220.

Healthdata now on disc

DEMAND from schools and colleges has led to a disc version of the Healthdata public viewdatabase operated by East London GP Dr Christopher Dobbing.

The discs will operate on any BBC computer using DFS and an 80-track double sided disc drive. Versions for the Master Compact and Econet are also available.

"Many schools and colleges asked for a copy of the database on disc to use off-line on their own computers, enabling them to avoid high telephone bills", said Dr Dobbing.

"In response to this I have produced a disc containing 382 of the most popular and relevant Healthdata pages.

"The viewdata format is easy to use and read. Many young people will find using the database more interesting than conventional health education textbooks and leaflets.

"Much of the information on Aids and contraception is very topical and not yet in the textbooks. It is relevant to Human Biology GCSE and Personal and Social Education and should make a useful extra resource for schoolwork in these subjects".

Price £9.95 for BBC Micro 5.25in disc, £11.95 for Master Compact 3.5in disc, and £18.90 for the Econet version, from Healthdata (01-725 5601).

Domesday developments

LATEST developments for the BBC Advanced Interactive Video system include a videodisc dealing with ecology, and software linked to the Domesday Project.

The new LV-rom Ecodisc provides a practical guide to ecology, taking as its basis a simulation of Slapton Ley nature reserve in Devon, which is primarily a field studies centre.

It enables students to draft a plan for the management of Slapton Ley and its various activities by discovering, learning and applying ecological facts and concepts.

Domesday Display is the first program which enables users to extract data and pictures from the Domesday discs and run them in the form of a slide show.

Two more floppy discs, due out later this year, will allow users to interface their own data with the maps contained on the Domesday National and Community discs.

"These floppy discs will let users access the unique infrastructure of the AIV system in order to store, manage, manipulate and retrieve data for strategic and tactical purposes", said Jean Nunn, head of educational developments at BBC Enterprises (01-576 0339).

Next year another information LV-rom disc is planned. It will contain detailed maps down to street level, with updated and new data sets for specific sectors of the industry and commerce market.

The Department of Trade and Industry has extended its £1,500 local authority grant for AIV systems in schools until September. Schools are not affected by the recent £500 increase in price of the Domesday system.

Add-on for MicroCodil

A SPECIALISED add-on disc has been released for MicroCodil, the database-handling language system for BBC Micros. Encouraged by the language's success, Codil Systems (044282 4895) has produced a History Project Disc.

The company says its product is ideal for handling historical information because "it uses a novel approach, based on a simple psychological model, to handle poorly structured information".

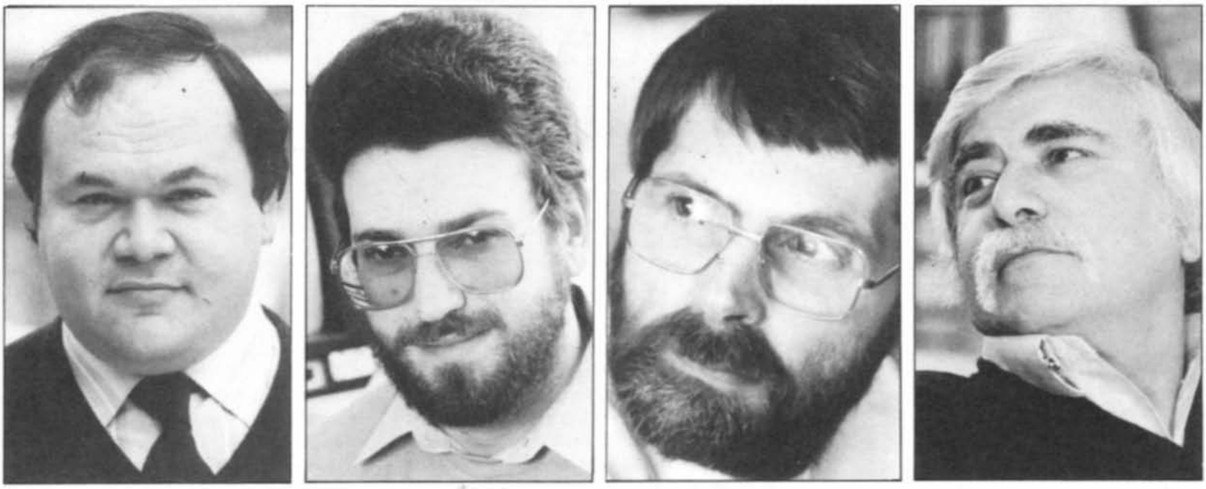
The basic teaching system is supplied with 12 demonstration knowledge bases, five of which deal with historical data. The complete Microcodil system costs £50, and the history project pack is £10 extra.

3D graphics system

A NEW design tool for users of the BBC Micro and Master is available from Silicon Vision. The Realtime Graphics System is supplied on a 32k graphics rom which allows the user to create any 3D wireframe object and subsequently produce animated sequences.

Five discs providing 3D editors are included and these consist of a 3D design system disc, applications disc, database library disc and a realtime demonstration disc.

A manual is also supplied. Price £79.95.



The problem solvers!

ADFS

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DFS

No-one doubts the benefits of discs over cassettes, but with this powerful 16k ROM you can save even more time and effort. Have a good look at the facilities available in. . .

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Input commands such as CHAIN LOAD *RUN *ACCESS *LOAD *COPY *DELETE *COMPACT *INFO *DUMP *TYPE and *EXEC by a single key press from a series of MENUs which are 'networked'. Move between menus at the touch of a key. To *DUMP a file simply select it from the menu and press a function key. Copy any number of files from disc to disc easily. Select the RUN menu and BEEBAID runs your programs at the press of a key. Load programs and list them automatically with page-mode set. Load machine code programs at the correct address for subsequent disassembly. Speed up your keyboard by 30 per cent.

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Camelot in the Classroom

Product: The Arthur Project
Price: £34.44 (extra sheets £3.95 a set)
Supplier: Chalksoft, PO Box 49, Spalding, Lincs, PE11 1NZ
Tel: 0775 69518

The Arthur Project: Generating a wealth of creativity

THE red presentation file of the Arthur Project provides a sensible and eye-catching package. It contains several plastic wallets holding the teacher's guide, software disc, set of slides with tape recorded commentary, two complete stories, four sides of A4 handouts and eight card worksheets.

The content gives good value for money, since the whole project can provide weeks of continuous work. I have a mixed ability class of 24 10 to 11-year-olds, and to try to cover the whole content I had to split my children into smaller groups – and even then I haven't been able to bring out the full scope of it in the six weeks I planned for the module.

Most, but not the vital areas of curriculum, are covered in this package. It was a bit light on maths/science and definitely biased towards language and creative arts. Even so, there are so many topics that the groups did not duplicate any of the major activities – although they would have liked to.

A computer is not required for much of the time, but for the Quest for the Holy Grail graphic adventure game we found that continuous access to a computer would have been preferable.

The children enjoyed playing the game and solving the many puzzles – often different solutions were needed since the game is slightly different each time it is played.

Some teacher interaction was required for less able children and more on-screen explanation would have saved a harassed teacher the chore of explaining the same thing to seven groups.

In general the graphics were acceptable, although the view of Stonehenge was out of perspective. The sound could have been used more effectively than the two short tunes – one to signify, "Well done – you got it right" and the other, "Oh dear – got it wrong – back to Camelot".

While the game was fun to play, the children were somewhat upset and frustrated when, having done their best, they discovered they were following an impossible quest – the Holy Grail can never be collected.

Much of the language was outside the class vocabulary and some parts of the plot were lacking in logic, but the story hung together well and frequent screen changes kept their interest.

The only real problem we had was with the initial loading of the program. As most of our school BBC Micros are fitted with Econet, a PAGE=&1900 was required before the program could be run. No mention was made of this in the accompanying information, and without this command the program crashes at the first encounter. A teacher less trained in using the computer would be easily stopped by this.

The workcards provided the main body of the work, and although generally well laid out with good illustrations, they quickly began to show signs of wear and tear. However, they generated a wealth of activity and interest, producing some excellent results.

A wallchart would be a useful addition or alternative, as the information is constantly referred to.

Only the most able of the children could cope with the comprehension at the beginning of each card without a lot of teacher assistance. The text was also at a high comprehension level, with most groups needing it to be read aloud to them.

The handouts were well received, but suffered from being a bit cluttered. And,

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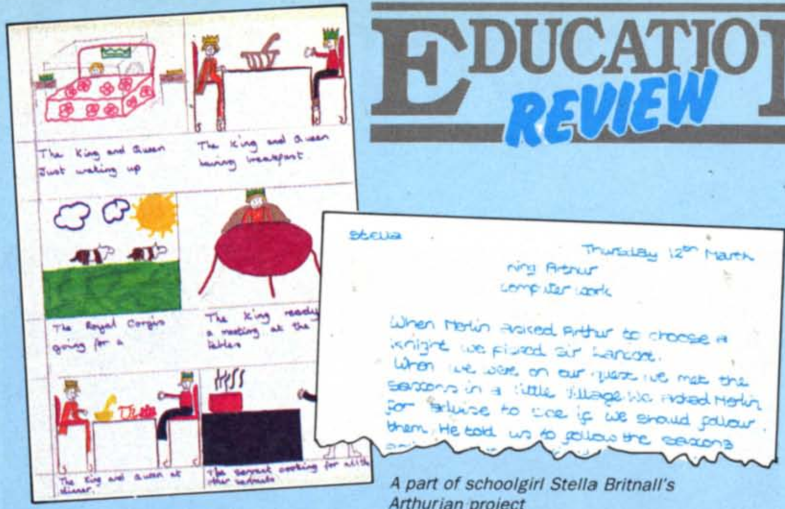
EDUCATION REVIEW


The King and Queen Just waking up
The King and Queen having breakfast
The Royal Corgis going for a
The King ready a meeting at the tables
The King and Queen at dinner.
The servant cooking for all the other servants

Stella

Thursday 12th March

King Arthur

computer work

When Merlin asked Arthur to choose a knight we picked Sir Lancot.
When we were on our quest we met the Seasons in a little village. We asked Merlin for advice to see if we should follow them. He told us to follow the seasons

A part of schoolgirl Stella Britnall's Arthurian project

◄ *From Page 71*

with the particular exception of the map of Arthurian Britain, they were superfluous, the groups preferring to use the library. Nor did they encourage the children to colour them in, due to the way they were drawn and shaded.

The slide commentary and story tapes were well over the heads of my class. None of the children could retell either story afterwards. And even on the best sound system the tapes were unable to stand any degree of volume without becoming distorted.

The slides were very disappointing – they were too dark even when shown in ideal conditions and several had no relevance or interest to the children.

In one particular case a slide comes up and the commentary burbles on about something completely unrelated. They are not worth the effort and could be left out.

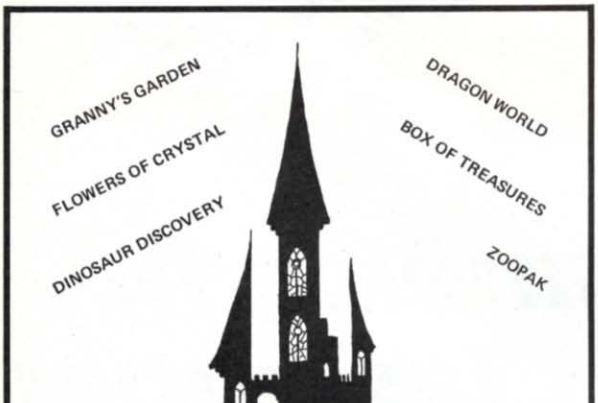
The children organised all their own group activities, with different children taking responsibility for different things. Then followed a veritable wealth of creative activities – role play, music making, speech writing, poetry and story writing, collages, clay work, papier mache, junk modelling, sewing and fabric dyeing to name but a few.

After two weeks the room was full of cardboard castles with working drawbridges and lifesize models of Excalibur – I didn't ask where they got the copper pipe from! More time would have given us performance level improvisations with original music and a school full of artwork.

For me the most important aspect of the Arthur Project was the enjoyment, self-motivation and individual child research, with each child exploring his own skills and initiative.

Despite the flaws, which do need attention, the project is an excellent idea. In the main it is well executed, with more that enough to interest 10 to 13 year olds. It is great value for money.

Shelley Gibson



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In-school information

David Barr describes his school's expanding viewdata system

DERAMORE High School is situated on the banks of the River Lagan approximately four miles from the centre of the city of Belfast. The school is relatively small, having some 650 pupils and 50 staff.

In 1981, in common with many schools in Northern Ireland, we were supplied with our first computer and wondered how this was to be of use within the curriculum. Since those early days we have progressed – the amount of equipment has increased through Mace networks, Econet levels 1 and 2 to the level 3 Econet now in use.

Alongside the growing equipment list grew the need to put the resource to use. I am sure many teachers in those heady days were greatly disappointed, as I was, at the lack of imagination shown by the early software.

An English teacher in the school sought my advice as the computer enthusiast as to suitable software which might offer something new in the teaching of English. We reviewed many contenders and came to the conclusion that a package must be reasonably content-free if it is to be of use for more than just a few periods.

We finally settled on Edfax by Techmedia. This was duly tested with a small fourth form group and the results of this trial convinced us that such databases were of great use.

The fourth form group also taught us a great lesson. We were both new to the use of teletext editors, yet the pupils mastered in 10 minutes the techniques that two teachers struggled with for some hours.

The initial trial with Edfax caused quite a spin-off for the whole school. At the time Band Aid was in the news, and the fourth form teletext pages were full of ideas to raise money for this cause. Many, including a non-uniform day, were to affect the entire school.

This experiment led us to investigate other teletext emulators, but we were disappointed at the limitations of the paging system, characteristic of the teletext systems. Viewdata, on the other hand, allowed the same textual and graphical expression of teletext but with a superior search method. Page numbers were therefore disregarded in favour of routed pages.

We considered many viewdata packages, finally deciding on Level 1 Communitel. Although complex, this had many desirable features in that it was already suitable for an Econet and capable of expansion to a host system.

At a much later stage we were to appreciate more fully just how important the initial choices were to be.

However, at this point the real work began. The school does not teach computers throughout the curriculum, so a small band of enthusiastic pupils was gathered together. Surprisingly this group (numbering initially three pupils and myself) was not drawn from the Computer Studies classes.

The only discernible common factor was willingness to give of their own free time. Thus lunchtime and after school was dedicated to the promotion of an in-school information system using a viewdata base.

The small band of helpers steadily built up pages of information relating to school activities. From this, their imaginations stimulated, other ideas were put forward as possible uses of viewdata.

A multiple path story (eventually to reach a length of 100 pages) called Crystal Quest was to be the first departure from straightforward information pages.

It is interesting to note that such a story allows the reader to interact with the plot itself. Pages offer him a choice along the lines of "What would you do now?"

The writers later used the viewdata system to mimic the element of chance, with some of the routes leading to lost lives, others continuing with the story. This element of chance changed depen-

Deramore Viewdata

The message page from Deramore Viewdata

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◀ *From Page 73*

ding on the situation of the reader within the story. The authors, now former pupils, were Paul Hanlon, Mark Fletcher and Tim Clarke.

By the middle of the first year the small band was growing, and with this came an expansion of topics and ideas.

A fishing section was followed by a video review, which in turn was followed by a large selection of reviews of computer games. By the end of the summer term some 500 pages were complete.

The original choice of software allowed the possibility of expansion to a host viewdata system. Although some schools in Northern Ireland were on Prestel, no other database was available within a local call rate.

Schools wishing to show the variety of viewdata available would have to incur trunk call rate charges and perhaps subscription charges too.

We decided to set up as a host viewdata system so that schools in the area would have at least one database at local call rate and with a local flavour. During August 1986 the system was tested out and the Help pages extended to give help to callers unfamiliar with our system.

On September 1, 1986 we officially went online as the first school viewdata system in Northern Ireland. Initially the response was slow, as few schools in Northern Ireland were equipped with modems and telephone lines, but steadily the number of callers grew. This had an encouraging effect on our little band, and more and more pupils were contributing to the information to be placed on the system.

As the original eager pupils left the school to seek work, others took their place. Contributors were originally confined to the fifth form, but the idea gradually worked its way through the fourth to the third form pupils.

The Belfast Education & Library Board, which had provided valuable support throughout the system's development, produced pages on teacher training courses and evening classes. Then the Northern Ireland Council for Curriculum Development (NICED) approached us to host information on their behalf and we were glad to oblige.

The whole idea had grown to a size which was occupying the whole team (now four times the original size) each lunchtime, struggling to deal with the flood of information to be included on the system.

As it stands now the database is – deliberately – a mix of serious and lighthearted information.

On the serious side we have reviews of new software packages so that teachers can try and keep up with technology, as well as information of courses designed as part of the in-service training provision of Belfast Education & Library Board. Information on AIDS is also available, alongside advice on how to stop smoking.

One area offers advice on what to do when it all goes wrong on an Econet network while a reference section will give you the name, address and telephone number of your local library.

The other side of the coin shows lots of areas on a wide variety of leisure topics from fishing advice, sports car preference to a computer-by-computer review of the latest arcade games (totally maintained by one fifth form pupil).

The pop charts are there too, as are film and video reviews. And so the list goes on.

Recently we have installed the ADFS version of Econet, allowing the facility of response frames (Communitel's Dom Wright has been of great help with this implementation).

In conjunction with the Belfast Education & Library Board Computer Development Officer, teachers in this area can now not only find out where and when in-service courses are, but also apply for them, avoiding both postal delays and the information cost inside the school's administrative system.

Currently standing at 1200 pages, the database relies heavily on the dedicated band of workers, including David Bowman, Colin Bell, Mark Goodwin, Paul McMichael and Niel McVeigh.

Pupils in the third, fourth and fifth years give up their free time in order to do all the work involved in maintaining the database. Week after week they key in new information, update the old and develop new styles of presentation.

Perhaps the most encouraging feature is that these pupils are now sufficiently proficient to teach the teachers how it all works. A sweet rather than bitter pill to swallow, and perhaps one which most encourages the Learning Garden approach, which has implications for the whole curriculum. ■

Neil McVeigh and David Bar

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M ✓

Ages 2-5

- Alphabet
- Colours
- Counting
- House
- Magic Garden
- Matchmaker
- Numbers
- Pelican
- Seaside
- Snap

Ages 5-8

- Balance
- Castle
- Derrick
- Fred's Words
- Hilo
- Maths Test
- Mouser
- Number Signs
- Seawall
- Super Spell

Ages 8-12

- Anagram
- Codebreaker
- Dog Duck Corn
- Guessing
- Hangman
- Maths Hike
- Nim
- Odd Man Out
- Pelmanism
- Towers of Hanoi

PELICAN
Teach your children to cross the road safely at a Pelican crossing

press any key

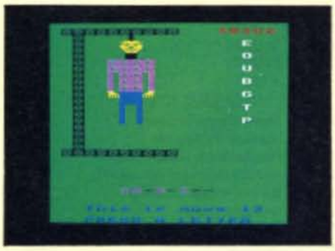
HOUSE
Select the colours to draw a house – hours of creative entertainment

SIGN
QUESTION: 9
WHICH SIGN GOES IN THE BOX?
5
3=2
SCORE:
✓✓✗✓✓✓✓✗✓
Test for PETER

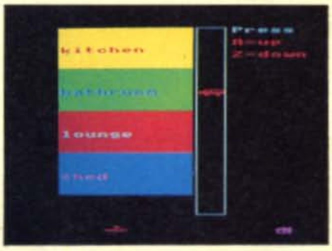
NUMBER SIGNS
Provide the correct arithmetic sign and aim to score ten out of ten

NUMBER BALANCE
TOO SMALL
THE CORRECT ANSWER IS 35+3 =38
PRESS SPACE
37
35+3

BALANCE
Learn maths the fun way. Type in the answer to balance the scales



HANGMAN
Improve your child's spelling with this fun version of the popular game


kitchen
bathroom
lounge
shed
Press
A=up
Z=down

ODD MAN OUT
Find the word that does not fit – before your time runs out

TO ORDER TURN TO THE FORM ON PAGE 151

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CUT OUT AND KEEP

BBC

Part No.	Description	
103 001	BBC Keyboard	61.49
103 003	BBC PSU	68.46
201 024	BBC Plastic Ruler	2.41
201 029	ULA Heat Sink	1.65
201 030	PSU Baseplate	2.14
201 121	ROM Slot cover	1.25
201 143	Keytop Set 'Comtec'	21.51
201 503	Aerial/TV Lead	1.76
201 521	Cassette Lead (7-7)	4.09
201 530	Econet Lead (5-5)	1.87
201 608	Speech Chip TM6100	10.88
201 628	Basic PB05	22.56
201 629	O/S PB04	14.83
201 647	Aspect Custom Chip	18.17
201 648	Apache Custom Chip	14.92
201 666	DNFS ROM	22.56
350 172	Space Bar (Comtec)	1.22
403 001	Welcome Cassette	11.64
580 103	10k Vertical Minature	1.60
580 204	200k Trimmer	1.60
699 001	2.22pF Trimmer	1.47
704 816	HM4816	2.51
705 050	SAA 5050	10.83
706 489	SN76489AN	7.51
706 502	6502A CPU	9.07
706 522	6522	6.53
706 845	6845	8.88
706 850	6850	3.40
706 854	68B54	9.12
707 002	UPD7002	9.81
708 271	8271	59.67
733 691	DS3691N	4.77
735 159	SN75159N	6.14
738 095	81 LS 95	1.38
739 120	88 LS 120	3.13
740 038	7438	1.48
740 045	7445	2.28
741 000	74 S 00	1.48
741 004	74 S 04	1.48
741 074	74 S 74	1.69
741 139	74 S 139	2.51
742 000	74 LS 00	1.64
742 002	74 LS 02	1.61
742 004	74 LS 04	1.78
742 010	74 LS 10	1.57
742 020	74 LS 20	1.43
742 030	74 LS 30	1.72
742 032	74 LS 32	1.72
742 051	74 LS 51	1.87
742 074	74 LS 74	1.91
742 086	74 LS 86	1.57
742 123	74 LS 123	1.95
742 132	74 LS 132	2.01
742 138	74 LS 138	1.62
742 139	74 LS 139	1.82
742 163	74 LS 163	2.12
742 244	74 LS 244	1.93
742 245	74 LS 245	3.45
742 251	74 LS 251	1.78
742 259	74 LS 259	1.89
742 273	74 LS 273	3.16
742 283	74 LS 283	2.41
742 393	74 LS 393	2.41
744 245	74 ALS 245	11.21
754 013	4013	1.97
754 020	4020	2.14
770 319	LM319	4.02
770 324	LM324	1.62
770 386	LM386	1.91
770 555	LM555	1.62
780 239	BC239	0.99
780 309	BC309	0.99
780 906	2N3609	1.26
794 148	1N4148	0.70

BBC (cont. . .)

Part No.	Description	
799 000	RED LED	0.95
800 001	Socket MAB5WH (RS432)	1.64
800 002	Socket MAB6H (RGB)	1.78
800 003	Socket MAB7SHL (Cassette)	1.82
800 004	Socket MAB5SH (Econet)	1.62
800 006	Header 34 Way	2.70
800 007	Header 40 Way	2.87
800 008	Header 26 Way	2.41
800 009	Header 20 Way	2.30
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800 051	Molex Pins 3 Way	1.01
800 054	Molex Pins 8 Way	1.24
800 055	Molex Pins 10 Way	1.72
800 059	Molex Pins 17 Way	1.57
800 070	Molex Mini Shunt	1.01
800 108	IC Socket 8 Way	0.99
800 114	IC Socket 14 Way	1.16
800 016	IC Socket 16 Way	1.22
800 120	IC Socket 20 Way	1.22
800 124	IC Socket 24 Way	1.22
800 128	IC Socket 28 Way	1.38
800 140	IC Socket 40 Way	1.51
800 200	AMP 110 Faston Connector	0.90
800 304	'D' Socket 15 Way	3.39
800 600	Socket BNC 75 ohm	2.30
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825 000	Modulator UHF UM1233	6.78
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860 005	Choke 33mH	1.62
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886 004	Keyswitch (Futaba)	1.53
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999 620	Keyswitch SMK	1.26
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999 623	Space Bar SMK	1.20
999 624	Keytop Set SMK	24.89
999 625	Keyswitch SMK	1.53
999 627	Keyswitch Wongs/SMK	1.53

BBC PLUS

201 241	O/S Basic ROM	22.56
201 274	ADFS ROM	26.96
201 880	PAL 16R4	13.08
2201 077	Plastic Ruler 64K	2.48
2201 113	1770 DFS ROM	22.08
701 770	WD1770FDC	31.10
704 105	64K X D-RAM	7.33
704 865	64K D-RAM	4.31
706 511	6512A	12.30
741 002	74 S 02	1.56
742 109	74 LS 109	1.61
742 253	74 LS 253	1.84
742 257	74 LS 257	1.66

MASTER 128

143 050	Master Keyboard Assy.	75.03
2201 119	Numeric Keytop Set	4.92
2201 121	Master Ribbon Cable Assy.	3.75
201 143	Alpha Keytop Set (Comtec)	21.51
143 003	Welcome/Utils Cassette	10.11
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201 647	Video ULA	18.17
201 648	Serial ULA	18.92
201 793	Loudspeaker Nest	1.55

MASTER 128 (cont. . .)

Part No.	Description	
201 805	Master Ruler	1.38
2201 134	Accessories Holder	2.98
2201 220	Welcome/Utils Disc	12.39
201 847	MSI I/O (CF30050)	16.65
201 844	MSI KEYBD ENC (CF30047)	12.98
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201 846	MSI CRTC MUX (CF30048)	12.98
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706 512	65SC12	11.71
706 522	6522	6.53
706 845	6845	8.88
706 850	6850	3.40
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707 002	7002	9.81
709 637	UA 9637 ACP	2.92
733 691	DS 3691 N	4.77
740 016	7416 (Alt to 7406)	1.94
740 038	7438	1.48
741 000	74 S 00	1.48
741 004	74 S 04	1.48
742 000	74 LS 00 (Alt to 74ALS00)	1.48
742 002	74 LS 02	1.45
742 014	74 LS 14	1.45
742 086	74 LS 86 (Alt to 74ALS86)	1.42
742 174	74 LS 174	1.64
742 244	74 LS 244	1.93
742 257	74 LS 257	1.85
742 259	74 LS 259 (Alt to 74ALS259)	1.89
742 373	74 LS 373 (Alt to 74ALS373)	1.91
748 000	74 F 00	1.78
748 074	74 F 74	1.78
749 253	74 HCT 253	1.68
770 324	LM 324	1.62
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800 002	Socket MAB6H (RGB)	1.78
800 003	Socket MAB7SHL (Cassette)	1.82
800 004	Socket MAB5SH (Econet)	1.62
800 006	PCB Header 34 Way	2.70
800 007	PCB Header 40 Way	2.87
800 008	PCB Header 26 Way	2.41
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800 043	Edge Connector 44 Way	3.56
800 050	Molex Pins 2 Way	0.88
800 051	Molex Pins 3 Way	1.01
800 067	Wafer 5 way	1.62
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800 080	Crimp Terminal	0.76
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800 083	Housing 3 Way	1.47
800 091	Wafer 2 Way	1.51
800 128	IC Socket 28 Way	1.38
800 203	Faston Tab .25"	0.95
800 304	Socket 15 Way 'D' Type	3.39
800 455	Wafer 15 Way	1.68
800 481	Socket Housing 5 Way	1.61
800 482	Socket Housing 12 Way	1.78
800 483	Socket Housing 19 Way	2.47
800 600	Socket BNC 75 Ohm	2.30
800 611	Socket Phono (Video)	1.91
801 200	Connector 20 Way	2.07

DRAM ELECTRONICS LTD.

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Tanks for the memory

Train your visual memory with this game

by Gary Holcombe

AFTER the development of the ultimate destructive weapons mankind has retreated into deep caverns and fights its wars with remote-controlled machines – Logo-Tanks.

But the power of the enemy radio jamming equipment is such that all instructions can only be sent as one data burst, and the hostility of the surface environment soon erodes the tracks and engine of the Logo-Tank, restricting the number of command bursts to five.

You must examine the screen showing one sector of the surface and plan the route of your Logo-Tank. Move to each weapons depot, gun emplacement and robo-copter and destroy it, but you must avoid running into any object on the screen.

Once you have cleared a screen your Logo-Tank is restored to full battle capability and moved into a more densely packed sector. But the same restrictions apply – only 40 commands in a group and only five groups may be sent.

You program the Logo-Tank with a simple set of commands: F for forward; L for left turn; R for right turn; S to shoot the Logo-Tank laser, which unfortunately only has a short range.

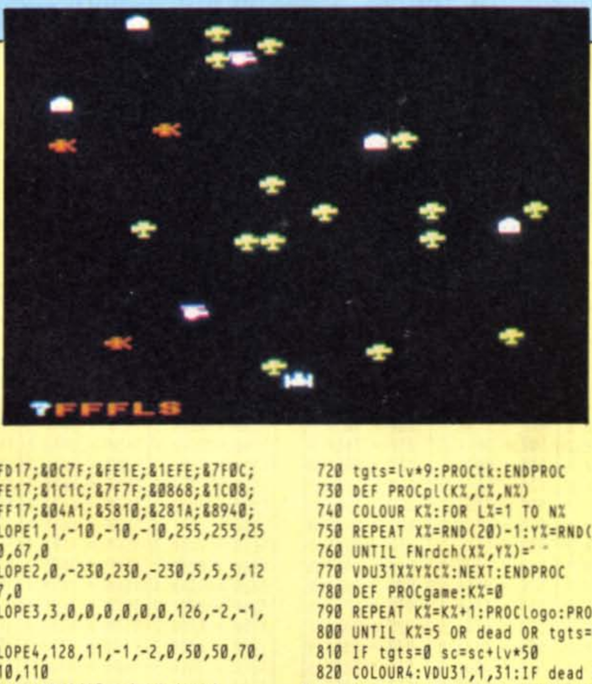
For example the sequence:

```
FFFRFLS
```

moves the tank forward three steps, turns right, moves forward another step, turns left and shoots.

You can alter commands by using the Delete key. Press Return when you want to send the command group.

Collision with any object totally disrupts the Logo-Tank and is fatal. You have been warned . . .



```
  100 REM ******************************
  110 REM *         LOGO-TANK          *
  120 REM *     by Gary Colcombe       *
  130 REM *    (c) The Micro User      *
  140 REM ******************************
  150 MODE7:PROCreloc(&E00)
  160 PROCtitle:REPEAT PROCinst
  170 UNTIL FNyn(CHR$131+"Instructions a
gain")="N"
  180 REPEAT MODE2:PROCcoff
  190 sc=0:lv=0:REPEAT CLS
  200 PROCinit:PROCgame:UNTIL dead
  210 MODE 7:PROCcoff:PROCnew:PROCres
  220 UNTIL FNyn("Another game")="N"
  230 MODE7:END
  240 DEF PROCcoff:VDU23;8202;0;0;0;:END
PROC
  250 DEF PROCnew:IF sc<h%(8) ENDPROC
  260 PROChd:PROCt(131)
  270 PRINTTAB(5,5)"You're on the High S
core Table"
  280 INPUTTAB(10,10)"What is your name"
'TAB(15,12)N$
  290 N$=LEFT$(N$+STRING$(10," "),10)
  300 I%=8:REPEAT I%=I%-1
  310 h%(I%+1)=h%(I%)
  320 h$(I%+1)=h$(I%)
  330 UNTIL sc<=h%(I%):P%=I%+1
  340 h%(I%+1)=sc:h$(I%+1)=N$
  350 ENDPROC
  360 DEF PROCres:PROChd:PROCt(132)
  370 PRINT''TAB(13)"High Scores"''
  380 FOR K%=1 TO 8:C%=131
  390 IF K%=P% D%=136 ELSE D%=32
  400 PRINTTAB(5)';K%") "h$(K%)" _ ";h%(
K%)
  410 NEXT:ENDPROC
  420 DEF PROCtitle
  430 DIM h$(8),h%(8):*FX4,2
  440 VDU&F717;&1800;&7E3C;&5A7E;&7E5A;
  450 VDU&F817;&30FE;&7F78;&787F;&0030;
  460 VDU&F917;&3900;&FC12;&12FC;&0039;
  470 VDU&FA17;&9918;&BD99;&FFFF;&81BD;
  480 VDU&FB17;&30FE;&7F78;&787F;&FE30;
  490 VDU&FC17;&BD81;&FFFF;&99BD;&1899;
  500 VDU&FD17;&0C7F;&FE1E;&1EFE;&7F0C;
  510 VDU&FE17;&1C1C;&7F7F;&0868;&1C08;
  520 VDU&FF17;&04A1;&5810;&281A;&8940;
  530 ENVELOPE1,1,-10,-10,-10,255,255,25
5,127,0,0,0,67,0
  540 ENVELOPE2,0,-230,230,-230,5,5,5,12
7,-1,0,0,67,0
  550 ENVELOPE3,3,0,0,0,0,0,0,126,-2,-1,
-1,126,100
  560 ENVELOPE4,128,11,-1,-2,0,50,50,70,
70,-3,-2,110,110
  570 logo$=STRING$(40," "):a$=logo$
  580 logo$="":a$="":lg$="FLRS"
  590 del$=CHR$127:cr$=CHR$13
  600 FORI%=1TO8:h$(I%)="Old Score "
  610 h%(I%)=50*(8-I%)+50:NEXT:ENDPROC
  620 DEF FNyn(t$):PRINT''t$"?";
  630 REPEAT A$=CHR$(GETAND&DF)
  640 UNTIL A$="Y" OR A$="N":=A$
  650 DEF PROCinit:lv=lv+1
  660 TX%=10:TY%=26:TD%=0:dead=FALSE
  670 grid=FALSE:Z%=RND(-TIME)
  680 PROCpl(2,254,lv*15)
  690 PROCpl(7,247,lv*4)
  700 PROCpl(5,248,lv*2)
  710 PROCpl(1,249,lv*3)
  720 tgts=lv*9:PROCtk:ENDPROC
  730 DEF PROCpl(K%,C%,N%)
  740 COLOUR K%:FOR L%=1 TO N%
  750 REPEAT X%=RND(20)-1:Y%=RND(26)-1
  760 UNTIL FNrdch(X%,Y%)=" "
  770 VDU31X%Y%C%:NEXT:ENDPROC
  780 DEF PROCgame:K%=0
  790 REPEAT K%=K%+1:PROClogo:PROCact
  800 UNTIL K%=5 OR dead OR tgts=0
  810 IF tgts=0 sc=sc+lv*50
  820 COLOUR4:VDU31,1,31:IF dead PRINT"O
ops, you crashed!"; ELSE PRINT"Screen ";
lv" cleared!";
  830 PROCwait(200):ENDPROC
  840 DEF PROClogo:*FX15
  850 IF grid PROCgrid
  860 PRINTTAB(0,28)SPC41;
  870 COLOUR6:PRINTTAB(0,28)"?";
  880 COLOUR1:logo$="":REPEAT a$=lg$
  890 IF logo$>"" a$=a$+cr$+del$
  900 IF LENlogo$=40 a$=cr$+del$
  910 REPEAT REPEAT I%=GET
  920 IF I%=127 i$=CHR$I% ELSE i$=CHR$(I
%AND&DF)
```

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EDUCATION PROGRAM

◀ From Page 77

```
  930 IF i$="G" grid=NOTgrid:PROCgrid
  940 UNTILi$<>"G":UNTILINSTR(a$,i$)
  950 IF i$=del$ VDU127:logo$=LEFT$(logo
$,LENlogo$-1):i$=""
  960 IF i$<>cr$ PRINTi$;:logo$=logo$+i$
  970 UNTIL i$=cr$:IF grid PROCgrid
  980 ENDPROC
  990 DEF PROCgrid:LOCAL X%,Y%:GCOL 3,1
 1000 FOR X%=0 TO 1279 STEP 64
 1010 MOVE X%,160:PLOT 29,X%,1023:NEXT
 1020 FOR Y%=160 TO 1023 STEP 32
 1030 MOVE 0,Y%:PLOT 29,1279,Y%:NEXT
 1040 sc=sc-1:ENDPROC
 1050 DEF PROCact
 1060 FOR I%=1 TO LENlogo$:SOUND0,1,1,1
 1070 i$=MID$(logo$,I%,1):COLOUR6
 1080 PRINTTAB(I%MOD20,28+I%DIV20)i$;
 1090 IF i$="F" PROCforward
 1100 IF i$="L" PROCleft
 1110 IF i$="R" PROCright
 1120 IF i$="S" PROCshoot
 1130 IF dead I%=40
 1140 PROCwait(15):NEXT:ENDPROC
 1150 DEF PROCforward:VDU31TX%TY%32
 1160 IF TD%=0 IF TY%>0  TY%=TY%-1
 1170 IF TD%=1 IF TX%<19 TX%=TX%+1
 1180 IF TD%=2 IF TY%<25 TY%=TY%+1
 1190 IF TD%=3 IF TX%>0  TX%=TX%-1
 1200 G$=FNrdch(TX%,TY%)
 1210 IF G$=" " PROCtk ELSE PROCcrash
 1220 ENDPROC
 1230 DEF PROCleft
 1240 TD%=TD%-1:IF TD%<0 TD%=3
 1250 PROCtk:ENDPROC
 1260 DEF PROCtk:COLOUR 6
 1270 VDU31TX%TY%250+TD%:ENDPROC
 1280 DEF PROCright
 1290 TD%=TD%+1:IF TD%>3 TD%=0
 1300 PROCtk:ENDPROC
 1310 DEF PROCinst:PROChd:PROCt(134)
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
 1320 PRINT'"Your mission -- should you
choose to"
 1330 PRINT"accept it -- is to destroy t
he enemy"
 1340 PRINT" emplacements.  You must pro
gram the"
 1350 PRINT"Logo-tank to move around the
 screen"
 1360 PRINT"shooting copters, guns and b
uildings"
 1370 PRINT"and avoid crashing into anyt
hing."
 1380 PRINT'"You have five attempts to e
nter up to"
 1390 PRINT"40 commands which the Logo-t
ank will"
 1400 PRINT"obey and clear the screen."
 1410 PRINT''"Press Space to continue";
 1420 REPEATUNTILGET=32
 1430 PROChd:PROCt(131):PRINT''
 1440 PRINTSPC5"F"SPC6"- Forward a step"
 1450 PRINTSPC5"L"SPC6"- Turn to Left"
 1460 PRINTSPC5"R"SPC6"- Turn to Right"
 1470 PRINTSPC5"S"SPC6"- Fire a shell"
 1480 PRINTSPC5"Delete - Delete last com
mand"
 1490 PRINTSPC5"Return - Proceed with co
mmands"
 1500 PRINTSPC5"G"SPC6"- Switch grid on
and off"
 1510 ENDPROC
 1520 DEF PROCt(C%):LOCAL L%
 1530 FOR L%=2 TO 24:VDU31,0,L%,C%
 1540 NEXT:VDU28,1,24,38,2,30:ENDPROC
 1550 DEF PROChd:VDU26,12
 1560 FOR I%=0 TO 1:VDU131,157,132,141
 1570 PRINTTAB(16,I%)"LOGO-TANK"
 1580 NEXT:PRINT'':ENDPROC
 1590 DEF FNrdch(X%,Y%)
 1600 LOCALA%,x%,y%,C%
 1610 x%=POS:y%=VPOS
 1620 VDU31X%Y%:A%=135
 1630 C%=(USR(&FFF4)AND&FFFF)DIV256
 1640 VDU31x%y%:IF C%<>32 C%=C%+96
 1650 =CHR$C%
 1660 DEF PROCcrash:dead=TRUE
 1670 SOUND17,4,200,10
 1680 SOUND16,3,7,10
 1690 PROCexpl(TX%,TY%)
 1700 COLOUR 1:ENDPROC
 1710 DEF PROCwait(t%)
 1720 LOCAL T%:T%=TIME+t%
 1730 REPEATUNTILTIME>T%:ENDPROC
 1740 DEF PROCshoot:*FX15,1
 1750 LOCAL C%,I%,U%,V%,X%,Y%
 1760 X%=TX%*64:Y%=(32-TY%)*32
 1770 IF TD%=0 V%=4:X%=X%+32
 1780 IF TD%=1 U%=4:X%=X%+64:Y%=Y%-16
 1790 IF TD%=2 V%=-4:X%=X%+32:Y%=Y%-32
 1800 IF TD%=3 U%=-4:Y%=Y%-16
 1810 REPEAT I%=I%+1:MOVE X%,Y%
 1820 x%=X%+U%*I%:y%=Y%+V%*I%
 1830 P%=POINT(x%,y%)
 1840 GCOL 3,RND(16):DRAW x%,y%
 1850 PROCwait(2):MOVE X%,Y%
 1860 DRAW x%,y%:UNTIL I%>38 OR P%<>0
 1870 IF P%<1 ENDPROC
 1880 X%=x%DIV64:Y%=31-(y%DIV32)
 1890 C%=ASCFNrdch(X%,Y%)
 1900 PROCexpl(X%,Y%)
 1910 IF C%=247 sc=sc+5
 1920 IF C%=248 sc=sc+15
 1930 IF C%=249 sc=sc+35
 1940 tgts=tgts+(C%<>254):ENDPROC
 1950 DEF PROCexpl(X%,Y%)
 1960 LOCAL T%:SOUND0,3,4,4
 1970 T%=TIME+200:REPEAT COLOUR RND(8)-1
 1980 VDU31X%Y%255:UNTIL TIME>T%
 1990 VDU31X%Y%32:ENDPROC
 2000 DEF FNchk(R%,S%)=FNrdch(R%,S%)=" "
 2010 DEF PROCreloc(Q%)
 2020 P%=PAGE:IF P%<=Q% ENDPROC
 2030 L%=TOP-PAGE:*TAPE
 2040 VDU129,136:PRINT"Relocating...";
 2050 FOR I%=0 TO L% STEP 4
 2060 SOUND&11,-7,I%*256/L%,1
 2070 Q%!I%=P%!I%:NEXT:PAGE=Q%
 2080 ?&13=?&13-P%+Q%:RUN
```

Get it right!

```
 100 =    0 0 | 430 = AF1C F |  760 =  16B 8
 110 =    0 0 | 440 = A46B 7 |  770 = AF80 0
 120 =    0 0 | 450 = BBF7 A |  780 = CE7E F
 130 =    0 0 | 460 = 75B3 9 |  790 = 534A D
 140 =    0 0 | 470 = D364 4 |  800 = 4FD0 D
 150 = 24A2 2 | 480 = E742 E |  810 = CF7B 2
 160 = 5166 2 | 490 = 5148 C |  820 = 9B3D F
 170 = D9CE 2 | 500 = 5BA4 3 |  830 = 7D88 7
 180 = CB22 1 | 510 = BB71 C |  840 = F89C B
 190 = 9E6A 6 | 520 = C831 0 |  850 = 4A96 7
 200 =  871 7 | 530 = 78BA 8 |  860 = 3987 5
 210 =  1E2 A | 540 = A1E6 E |  870 = DA0B 0
 220 = 122A 3 | 550 = CC54 E |  880 = BFCD D
 230 = CDB0 F | 560 = 427E 1 |  890 =  DCB D
 240 = 1FC7 9 | 570 = 9AFA 5 |  900 = 555A D
 250 = 69DD 0 | 580 = 3F4F A |  910 = D797 D
 260 = 6325 E | 590 = 6361 6 |  920 = 7DB8 7
 270 = A160 B | 600 = 1581 0 |  930 = EDA1 B
 280 = E990 E | 610 = A0DF 5 |  940 = 5E2D 6
 290 = CC0B E | 620 = B3B8 D |  950 = 4159 9
 300 = ED1C 6 | 630 =  B57 8 |  960 = 11AC F
 310 =  396 7 | 640 = 4EFE 2 |  970 = 1F1C 1
 320 = D2A6 3 | 650 = FDE4 2 |  980 = ED0F 5
 330 = 67CD 5 | 660 = D66D 1 |  990 = 58D0 A
 340 = A6CC 4 | 670 = 6930 B | 1000 = B3C6 F
 350 = ED0F 9 | 680 = 3BCC F | 1010 = A173 B
 360 = DA3D 4 | 690 = 5BE5 2 | 1020 = 80EA 5
 370 = 397D 3 | 700 = DB19 1 | 1030 = 8D11 6
 380 = FE69 B | 710 =  10E 8 | 1040 = F7AB 1
 390 = CC04 C | 720 = 6661 8 | 1050 = 5C57 E
 400 = 27AD 4 | 730 = E21D 2 | 1060 = 480B C
 410 = E531 C | 740 = 67DA 3 | 1070 = CD86 C
 420 = 5C22 4 | 750 = CDF1 F | 1080 = 3BA7 D
```

```
1090 = DD32 C | 1420 = 5B81 7 | 1750 = EE24 6
1100 = F610 9 | 1430 = F4EC 4 | 1760 = 108A 1
1110 = 74AD 0 | 1440 = D078 4 | 1770 = 5374 2
1120 = 735D B | 1450 =  124 6 | 1780 = 8852 D
1130 = 15ED 7 | 1460 = 586F 2 | 1790 = E90F A
1140 = 5432 D | 1470 = 49DF 4 | 1800 = 2513 6
1150 = 46B0 5 | 1480 = BB7C C | 1810 = 4BB0 9
1160 = 9CCD E | 1490 = C983 C | 1820 = 42FC 8
1170 = 3A0A 4 | 1500 = B4F4 E | 1830 = C5F0 2
1180 =  D12 3 | 1510 = ED0F 6 | 1840 =  B19 A
1190 = 5D83 C | 1520 = FA73 6 | 1850 = 446C 9
1200 =  D71 D | 1530 = F645 4 | 1860 = 66A0 D
1210 = E4E8 2 | 1540 = 4E8A E | 1870 = F807 8
1220 = ED0F 2 | 1550 = 3D05 2 | 1880 = 778D B
1230 = 1C5D 4 | 1560 = 7C59 D | 1890 = BE74 C
1240 = F0F7 2 | 1570 = 3FBF 1 | 1900 = B251 6
1250 = 9F9A 2 | 1580 = AC04 0 | 1910 = 96E9 E
1260 = 6839 D | 1590 = D731 E | 1920 = F6FC F
1270 = 14C6 5 | 1600 = 176C 1 | 1930 = FFDB F
1280 = 4540 1 | 1610 = 3F93 B | 1940 = 6F37 B
1290 = 570B 5 | 1620 = 1EF3 D | 1950 = 48A0 7
1300 = 9F9A A | 1630 =   69 4 | 1960 = 65FB 6
1310 = 6F83 7 | 1640 = AA7D A | 1970 = 210C 1
1320 = 94D3 2 | 1650 = 8599 4 | 1980 = 50BB D
1330 = 3DC8 1 | 1660 = 99C9 E | 1990 = 2598 E
1340 = 4A54 A | 1670 = CB51 3 | 2000 =   7D 5
1350 = 4421 4 | 1680 = A641 9 | 2010 = A908 9
1360 = C233 1 | 1690 = 9BC5 D | 2020 = 2BF0 7
1370 = 5957 C | 1700 = 1123 4 | 2030 = 3AB1 1
1380 = 1040 C | 1710 = 5DC9 E | 2040 = 620A 7
1390 = FD21 5 | 1720 = E4DA C | 2050 = 6348 A
1400 = DF3B F | 1730 = 5D4E 6 | 2060 = FB8E 3
1410 = ECDC A | 1740 = 30E7 6 | 2070 = C243 A
              |               | 2080 = 2FAE 9
```

This listing is included in this month's tape & disc offer. See order form on Page 151.

EDUCATION LETTERS

Keep your letters coming in – the education pages are here to reflect your interests. We want to hear your tips, ideas, experiences and suggestions. Send your contributions to:

Peter Davidson, Education Editor, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY.

WP in schools

I STRONGLY disagree with Doreen Goldstone's letter in the April issue of The Micro User.

Her article, Quality of Display, refers to school children using word processors, yet she does not make clear which age group or age groups she is so concerned about.

Are her criticisms levelled at all word processors currently being used in this country's schools, or is it rather the case that she has not bothered to examine the many different word processing systems available?

Four years of teaching have convinced me that children need motivation if they are to produce their best work, and that some children find using conventional writing materials a tiresome and often messy business.

Why then is Doreen Goldstone so opposed to having the "...walls adorned with examples of pupils' work which have been created using word processors"?

I also disagree with any attempt to compare the work of a professional typist with that of a child using a word processor.

A typist normally produces good copies of someone's work, such as the boss's letters; a child using a word processor is either writing a piece for the first time or editing and revising his or her own work, often in the light of the teacher's comments.

Why shouldn't children correct their own work with the aid of a word processor? Drafting, editing and rewriting are the author's stock-in-trade. Go and see a manuscript of any famous novel and you will realise that Tolstoy did not write a fair copy of War and Peace straight off the top of his head.

Lastly, I think that Doreen Goldstone does not follow the logic of her own arguments. She slams self-taught enthusiasts (and by this I think she means teachers like myself who are interested in word processing but do not possess RSA certificates) and is angry that they are not "...qualified typists/word processing teachers".

Has it crossed her mind that teachers with these qualifications can earn far more in business than they can in education? This being the case, "self-taught enthusiasts" are all that schools are likely to have. – **Simon Hill, Southampton.**

Timetable software

IN THE May 1987 issue of The Micro User *there is a short report concerning school timetabling software recently released by Keith Johnson.*

I would be most grateful if you would advise me of the publisher of the software and the address to which I should write for further information. – **C.F. Sander, Kingston-Upon-Hull.**

● Further details can be obtained from Keith Johnson, 120A Urmston Lane, Stretford, Manchester M32 9BQ.

Right to disagree

I READ the letter The Case for Logo before noticing the name and status of the writer. Naturally it could have originated only from an employee of Logotron. However, in our democratic society, where freedom of thought and expression is a fundamental right, I must take exception to Mr. Roper's philosophical position which would remove the right to question the educational value of anything or any ideal.

Since the beginning of time, thinking people have been questioning issues in education. This is how education is moulded, as a living, ever-changing idea. I am writing to ensure that our rights to question the educational validity – yes, even of Logo – are preserved for ever more.

That Logo has been favourably written about, and purchased by many schools is not in the least disputed. But none of this information proves Logo's educational value. And even if it did, Philip Andrews, and anyone else for that matter, must be allowed to retain his right to disagree. – **Graham Conridge, Leyton, London.**

Colour printers

I AM writing to you with a query about our colour printer – a Canon PJ-1080A. At present we are using a Mode 7 Ceefax Simulation program and the only way we can dump screens is in black and white. We would obviously like to print it for the children in colour if that is possible.

Do you know of any program that can dump out these teletext characters?

We are also thinking of purchasing a mouse and an art package. Do you know of any software package that will print in colour on our printer? – **F.A. Darlington, Birkenhead, Wirral.**

● Colour printers need dedicated software and unfortunately we know of none for your printer. Have any of our readers written the necessary dump program or know where one can be obtained?

Explaining loops

I TEACH computer studies, and as part of the course I have to teach Basic. I have a problem explaining FOR-...NEXT loops and was wondering if you can help.

Consider the following short program:

```
10 FOR I=1 TO 10
20 PRINT "HELLO"
30 NEXT
```

This prints out HELLO 10 times as I would expect. However, if line 10 is changed to 10 steps of 0.1 only nine HELLOs are printed. In other words, the following doesn't work as I would expect:

```
10 FOR I=0.1 TO 1 STEP 0.1
20 PRINT "HELLO"
30 NEXT
```

Could you please tell me why it doesnt loop 10 times? – **J. Wasp, Manchester.**

● First, you need to know how FOR...NEXT works. The micro takes the first value as a counter, executes all other statements up to the NEXT, increments the counter and – providing it doesn't exceed the the final value – the loop is restarted.

If you are incrementing by 1, as you are in your first example, the computer will reach 10 and return for one more loop. However, if your increments are 0.1, the micro may go from 0.9 (approximately) to a number above your limit. The following program illustrates this:

```
10 FOR I=0.1 TO 2 STEP 0.1
20 PRINT I
30 NEXT
```

The way to avoid your limit being missed is to use a slightly higher number. So in your second program, to achieve the result you want, change line 10 to:

```
10 FOR I=0.1TO1.001STEP0.1
```

This ensures that the last time round the loop will not be missed because of the small rounding errors in the numbers.

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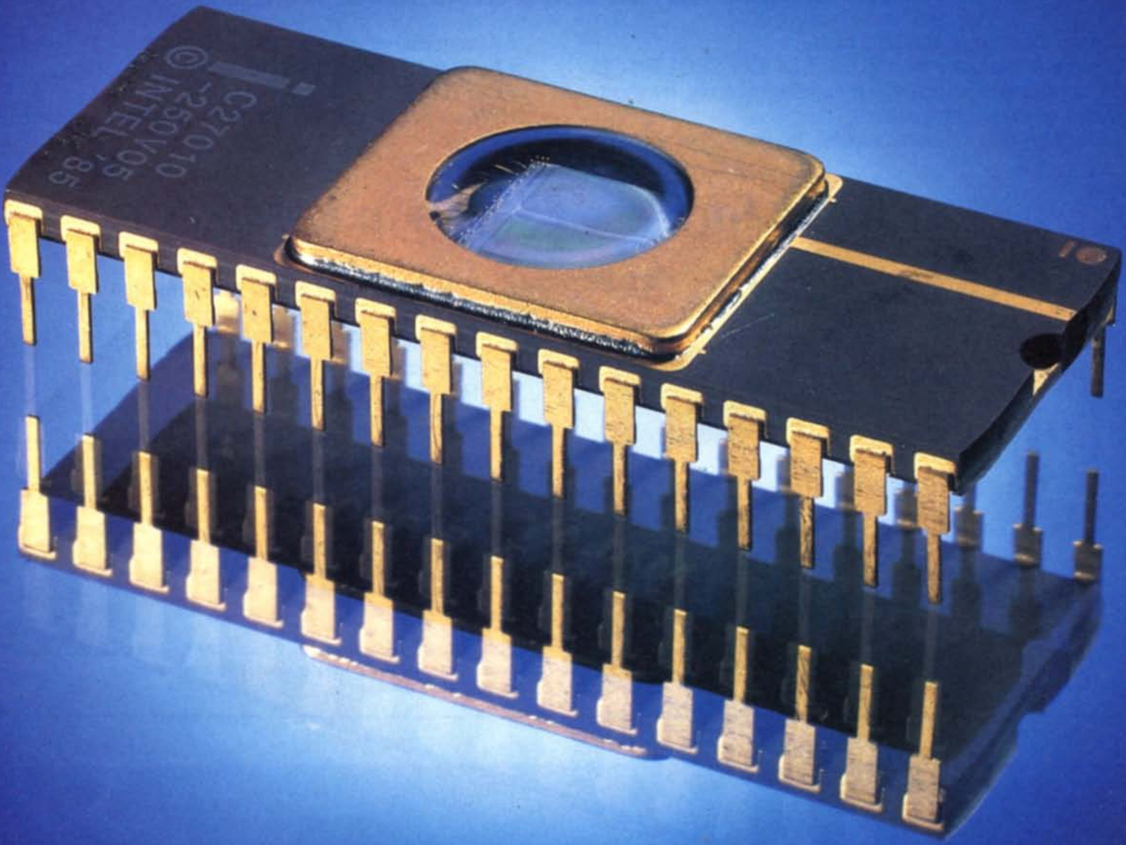

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Compatible with all the major word processors

SPELL-MASTER has been designed to fully integrate with the most popular word processors on the BBC, WORDWISE and WORDWISE PLUS, VIEW and of course INTER-WORD. While editing in these word processors all that is necessary to control SPELL-MASTER is to press one CTRL key (Usually CTRL-J). This causes a menu to appear listing a variety of options such as 'Check entire text', 'Check word at cursor', 'Continuous check - on/off etc. Text is checked directly in memory while in the word processor. There are even short-cuts to the menu, for example, pressing CTRL-V in any of the above word processors will start checking the text immediately from the current cursor position. Compare this with the process of checking text in the most highly rated competitive product - VIEWSPELL.

VIEWSPELL	SPELL-MASTER
•Save text from word processor. •Enter spelling checker. •Load text into spelling checker. •Check the text. •Go back to word processor. •Load marked text.	•Press CTRL-V
•...finally, make corrections.	• make corrections.

Check entire text

In a word processor, SPELL-MASTER can check at up to 10,000 words per minute. Whenever a word is indicated as misspelt the user is given three simple choices. Replace the word with another selected from the dictionary, ignore the word altogether or add it to a user dictionary.

Check as you type

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User Dictionaries

SPELL-MASTER supports extensions to the main dictionary in sideways RAM or ROM. This has the advantage that there is no speed degradation when checking against user dictionaries, since there are no disc accesses required at all. Once a word is added to a user dictionary it is treated as if it is present in the main dictionary.

SPELL-MASTER can support a number of separate dictionaries at once, each sideways RAM or ROM holding up to 3000 additional words. Once a dictionary has been created it can be 'burned' into an EPROM to form a permanent extension to the main dictionary.

Provision is made for editing any dictionary extension, for adding or deleting words in bulk, and directly loading or saving user dictionaries from or to sideways RAM.

Additional star commands

These can be issued from any language ROM such as spreadsheets or BASIC (they can even be included into BASIC programs). Some of the 8 commands are:

`*CROSSWORD` - Will search the entire dictionary for words that exactly fit the search pattern. For example *CROSS. ##M#U#ER would list ARMOURER, COMMUTER, COMPUTER. It takes about 8 seconds to check against all 59,000 words.

`*ANAGRAM` - Will list all the words in the dictionary that contain the same letters as those specified.

`*FUZZY` - Will list all words that sound something like the one you are searching for. If you are not sure of the spelling of a word then entering the approximate spelling here will generally list the word you are looking for.

Price: £59.00 incl.

Upgrades

Owners of the older two chip versions of SPELL-MASTER can upgrade to the single chip version for £25.00. However this new version is functionally equivalent and so it should not be necessary to upgrade.

2nd processors

Due to its unique design SPELL-MASTER will not work with word processors running on the 6502 2nd processor, although there are facilities provided for checking long text files.

VISA

Computer Concepts

Access

Gaddesden Place, Hemel Hempstead, Herts HP2 6EX Telephone: (0442) 63933

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

BBC MASTER SERIES

AMB15 MASTER (see page 6 for details of bundled software included in the price)	£395 (a)
AMB12 MASTER ET	£315 (a)
AMCO6 Turbo 65C02 Module	£99 (b)
ADC08 512 Processor	£195 (b)

ADF14 ROM Cartridge	£13(d)	ADJ23 Ref Manual Part II	£14(c)
ADF10 Econet Module	£41(c)	ADJ24 Adv Ref Manual	£19.50(c)
ADJ22 Ref Manual Part 1	£14(c)	View User Guide	£10(d)
BBC Master Dust Cover	£4.75(d)	Viewsheet User Guide	£10(d)

MASTER ROM/RAM CARTRIDGES

TRC1 Two rom cartridge	£8.95 (d)
TRC4 Four rom cartridge	£11.95 (d)
TRC 32K Cartridge inc RAM	£29.95 (d)

BBC MASTER COMPACT

See page 6 for free bundled software

SYSTEM 1 128K, Single 640K Drive & bundled software.	£385 (a)
SYSTEM 2 System 1 with a 12" Hi Res Monochrome Monitor.	£469 (a)
SYSTEM 3 System 1 with a 14" Med Res RGB Monitor.	£599 (a)
Second Drive Kit.	£99 (c)
Serial Kit.	£29 (d)
T.V. Modulator	£29 (d)
Extension cable for external 5.25" 80T Drive .	£12.50 (d)
Mertec Adaptor (Upgrades to almost master level)	£35 (c)

UPGRADE KITS

1.2 OS ROM	£15 (d)	ADFS ROM	£26 (d)
DNFS ROM	£17.50 (d)	1770 DFS Kit	£43.50 (d)
BASIC II ROM	£22.50 (d)	Econet Kit	£55 (d)

ECONET ACCESSORIES

Econet Starter Kit	£85 (b)	Econet Bridge	£174 (b)
Econet Socket Set	£29 (c)	Printer Server Rom	£41 (d)
File Server Level II	£75 (b)	10 Station Lead Set	£26 (d)
Master FS Utility Disc	£17.25 (d)		

ACW/CO-PROCESSOR

For full specification see page 5

32016 Co-processor	£999 (a)
Cambridge Workstation	£3450 (a)
X25 Gateway	£2175 (b)

PANOS/PANDORA Upgrade incl 32000 BASIC FP.	£29 (d)
Co-Processor upgrade to 10 MHz operation for faster processing.	£POA (d)
Time Warp Real Time Clock with utilities for reading time and date in PANOS (for model B and B+ users).	£39 (c)
32016 Instruction Set Manual.	£25 (c)

WINCHESTER DRIVES

P20HD TECHNOMATIC 20 Mbyte Winchester Drive including Acorn ADFS ROM	£599 (a)
P10HD TECHNOMATIC 10 Mbyte Winchester Drive. Fully compatible with Acorn ADFS **Special offer**	£399 (a)
P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom.	£849 (a)
P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom.	£1,499 (a)
TS10 10 Mbyte Tape Streamer Backup unit with utilities.	£695 (a)
TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10.	£19 (d)
Enquire for larger capacity Winchesters. These Winchesters are compatible with the S.J. File Server. Special adaptor for S.J. File Server	£28 (d)

WINCHESTER
Drive Multiplexer

TWM2 for two computers.	£99 (b)
TWM4 for four Computers.	£159 (b)

***Details on Technomatic Winchesters** on page 6*

SECOND PROCESSORS

Universal 2nd Processor Adaptor	£75 (b)
TORCH ZEP100	£229 (a)
MULTIFORM Z80 TECHNOMATICs multi format Z80 system includes a FREE Pocket Wordstar + MS/DOS Read/Write Utility	£289 (b)

ACORN IEEE INTERFACE

Allows BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard. The interface can link upto 14 compatible devices. Typical applications are in experimental work in academic and industrial labs.	£265 (a)

TELETEXT ADAPTOR

Converts your computer into a teletext receiver.	£75 (b)
BBC Publications rom for enhanced Teletext Utilities.	£7.95 (d)

PRINTERS

150 cps, variety of fonts, including NLQ, bit image graphics, IBM char/graphics compatible, centronics interface and tractor feed as standard	£229 (a)
EPSON FX800 An enhanced version of FX85. Call for details.	£329 (a)
EPSON FX1000 An enhanced version of FX105. Call for details.	£449 (a)
EPSON EX800 See details on page 5.	£409 (a)
Colour option for EX800/EX1000.	£59 (b)
EPSON LQ800 See details on page 5.	£439 (a)
EPSON LQ1000 As LQ800 but wider carriage for 136 columns.	£589 (a)
TAXAN KP815 Enhanced KP810 with 160cps and full IBM compatibility.	£269 (a)
TAXAN KP915 Enhanced KP910 with 180cps and full IBM compatibility.	£369 (a)
NATIONAL PANASONIC KX P1081	£169 (a)
STAR NL 10 (Parallel Interface)	£209 (a)
STAR NL 10 (Serial Interface)	£279 (a)
INTEGREX Multicolour Inkjet printer.	£549 (a)
Ideally suited for high res colour VDU screen dumps. Quiteness & consistent output are major characteristics.	£525 (a)
BBC Screen dump for Integrex.	£15 (d)
BROTHER HR20 A new attractively styled printer from Brother with unusually quiet operation, host of new fatures, including option to copy current documents. 8K buffer standard expandable to 16K. Parallel & Serial ports as standard.	£349 (a)
NAT PANASONIC KX P3131 Daisy wheel printer with 38K buffer, 17 cps, bi-directional, parallel interface	£249 (a)
JUKI 6100 Daisy wheel printer 15 cps, 2K buffer, switchable 10/12/15 cpi proportional spacing, underlining. Parallel interface.	£319 (a)

PLOTTERS

HITACHI 672	£479 (a)
GRAPHICS WORKSTATION	£599 (a)

LINEAR GRAPHICS
Full range of accessories available for plotmate plotters

A4S PLOTMATE	£370 (a)
A4SM PLOTMATE	£450 (a)
A3M PLOTMATE	£569 (a)

(Enquire re educational prices for the Linear Graphics plotters)

Parallel Printer Lead (1.2m).	£6 (d)
Serial Printer Lead (1.2m).	£7 (d)

PRINTER SHARERS & BUFFERS

BUFFALO PB Buffer
Parallel buffer for internal fitting to most Epson printers. Simple to instal.

PB128 (128K)	£99 (c)

PERIPHERAL & COMPUTER SHARERS
High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases. all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£45(c)	25v25-2	£45(c)
3 Computers to 1 Printer 36v36-3	£69(c)	25v25-3	£65(c)
4 Computers to 1 Printer 36v36-4	£85(c)	25v25-4	£75(c)
2 Computers 2 Printers X-over 36v36-x	£69(c)	25v25-x	£65(c)
BBC Cable set 3 to 1 (1m ea)	£32(d)		£34(c)
BBC Cable set 4 to 1 (1m ea)	£39(d)		£41(c)

BBC Computer Sharer: TCS26 1 computer to 2 printers fitted with BBC cable	£22 (c)

Paper & Labels
Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12 (£3.50)
2000 sheets 14½ × 11"	£18.50 (£4.50)
1000 sheets A4	£12.50 (£3.50)

Labels/1000

Single Row 3½ × 1 7/16"	£5 (d)
Triple Row 2 7/16" × 1 7/16"	£5 (d)

TECHNOLINE
(24 hr viewdata system)
Tel:01-450 9764

MAIL ORDER
17 Burnley Road
London NW10 1ED
Telex:922800

RETAIL SHOPS
15 Burnley Road, London NW10 1ED
Tel:01-208 1177 Telex:922800
(close to Dollis Hill ⊖)
West End Branch
305 Edgware Road, London W2
Tel:01-723 0233
(near Edgware Road ⊖)

For fast delivery telephone
your order on 01-208 1177
using VISA/Acess Card

Orders welcome from
government depts &
educational establishments

All prices ex VAT.
Prices are subject to
change without notice
Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

DISC DRIVES

All floppy drives carry a two year warranty

5.25" Single Drives 40/80 switchable:

TS400 400K/640K	£114 (b)
PS400 400K/640K with integral mains power supply	£129 (b)

5.25" Dual Drives 40/80 switchable:

TD800 800K/128OK	£199 (a)
PD800 800K/1280K with integral mains power supply	£229 (a)
PD800P 800K/1280K with integral mainspower supply and monitor stand	£249 (a)

3.5" 80T DS Drives:

TS351 single 400K/640K	£75 (b)
PS351 single 400K/640K with integral mains power supply	£119 (b)
TD352 Dual 800K/1280K	£135 (b)
PD352 Dual 800K/1280K with integral mains power supply	£187 (b)
PD853 Combo Dual 5.25"/3.5" drive with psu.	£229 (a)

DISC DRIVE MULTIPLEXER

TDM2 Dual Unit: 2 computers/one drive unit	£75 (b)
TDM4 Quad Unit: 4 computers/one drive unit	£135 (b)

3M FLOPPY DISCS

5.25" Discs in packs of 10

744 40T SS DD	£10.00 (d)
745 40T DS DD	£12.00 (d)
746 80T SS DD	£14.50 (d)
747 80T DS DD	£15.50 (d)

(Add £1 for library case packing)

3.5" Discs in packs of 10

80T SS DD	£20 (d)
80T DS DD	£25 (d)

BULK DISCS

High quality unlabelled discs supplied in packs of 50 in a storage box. The 5.25" discs have the reinforcing hub rings. These discs are guaranteed for life.

50 5.25" 40 T single sided discs in lockable box.	£35 (b)
50 5.25" 80T double sided discs in lockable box.	£45 (b)
50 3.5" 80T double sided discs in lockable box.	£95 (b)

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs	£12.50 (d)
3.5" Kit with 20 disposable discs	£14.00 (d)

DISC STORAGE BOXES

DB340 Lockable 40 x 3.5"	£8.50 (c)
DB550 Lockable 50 x 5.25"	£9.00 (c)
DB570 Lockable 70 x 5.25"	£11.00 (c)
DB5100 Lockable 100 x 5.25"	£13.00 (c)

MONITORS

BBC lead incl with all monitors

MICROVITEC 14" RGB Monitors
Please specify plastic or metal case.

Microvitec 1431 Standard Resolution 453 pixels	£179 (a)
Microvitec 1431AP As 1431 + composite video and sound input	£199 (a)
Microvitec 1451 Medium Resolution 653 pixels	£225 (a)
Microvitec 1451AP As 1451 + composite video and sound input	£259 (a)
Microvitec 1441 High Resolution 895 pixels	£365 (a)

Microvitec 20" RGB/PAL/ Audio Monitors

Microvitec 2030CS Standard Resolution RGB/Comp Video	£380 (a)
Microvitec 2040CS High Resolution RGB/Comp Video	£685 (a)
TOUCHTEC-501 Brings genuine touch screen operation on metal cased Microvitec monitors, incl utilities disc with starter and development programs	£239 (b)
TAXAN SUPER VISION 620 12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible	£279 (a)
TAXAN SUPER VISION 625 12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible.	£329 (a)
MITSUBISHI XC1404 14" Med Res RGB Monitor Etched dark screen brilliance and contrast control, BBC/IBM compatible	£219 (a)

12" MONOCHROME MONITORS

TAXAN KX 117 Hi Res green etched screen	£85 (a)
TAXAN KX 118 Hi Res Long Persistence (P39)	£95 (a)
TAXAN KX 119 Hi Res amber etched screen	£95 (a)
PHILIPS BM 7502 Hi Res green screen. Supplied with swivel stand	£75 (a)
PHILIPS BM7522 Hi Res amber screen. Supplied with swivel stand	£75 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£20 (c)
Philips Swivel Base	£14 (c)
Monitor Stand Models B & B +	£10 (c)
Monitor Stand Master	£13 (c)
Double Tier stand Models B, B + or Master	£24 (b)
Taxan RGB Lead	£5 (d)
Microvitec Lead	£3.50 (d)
Monochrome BNC/Phono Lead	£3.50 (d)

EPROMS/RAMS

2764-25	£3.20 (d)
27128-25	£3.50 (d)
6264LP-15	£2.80 (d)
27256	£5.50 (d)
27512	£9.00 (d)

RAM/ROM EXPANSION

ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms + 2 8K Rams	£37 (c)
ATPL Battery backup kit	£16 (d)
ATPL Board for BBC+ (now in stock).	£31 (c)

TIME WARP

Real Time Clock. Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program	£31 (d)
Time Warp with PANOS Utilities.	£39 (d)

MODEMS

All modems listed below will be supplied with BBC Publications ModemMaster comms package and a BBC data lead.

MIRACLE WS2000V21/23 & BELL stds	£92 (c)
WS2000 Auto Dial Card	£27 (d)
WS2000 Auto Answer Card	£27 (d)
WS2000 SK1 Kit	£5 (d)
WS2000 User Port Lead	£5 (d)
MIRACLE WS4000 V21/23	£135 (b)
MIRACLE WS3000 V21/23	£265 (b)
MIRACLE WS3000 V22	£445 (b)
MIRACLE WS3000 V22 bis	£585 (b)

(All modems are BABT approved)

BBC Data Cable for WS3000/4000	£7 (d)

PROGRAMMING ACCESSORIES/SOFTWARE

See page 5 for detailed specification

Compatible with B, B + and Master

EpromRyter (Epromer II) Eprom Ryter is compatible with BBC Master only	£119 (b)
Upgrade of Epromer II to Eprom Ryter	£49 (b)
EPROMER II	£89 (b)
MPROMER	£49 (c)
META ASSEMBLER	£145 (b)
PORTAL EPROM EMULATOR 128/512K	£245(b)
TEAM Disassembler	£145 (b)

EPROM ERASERS

UV1B 6 eproms, safety cutout	£47 (b)
UV1T 6 eproms, timer, safety cutout	£59 (b)

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

CAD/DRAWING PACKAGES

NovaCad Cad Package for B, B+ & MASTER. (See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£79 (d)
TM Version plus Tracker Ball	£119 (c)
TM Version plus Mouse	£105 (c)
Plotter Driver Generator	£25 (d)
MOUSE	
AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£63 (d)
PAGEMAKER	£39 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£21 (d)
MAX	£17.35 (d)
STAND ALONE MOUSE (includes horizontal scroll lock)	£34 (c)
RB2 TRACKER BALL	
RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR incl VAT	£39.50 (d)

CP/M SOFTWARE

for Acorn, Torch & Multiform Z80 Processors

MICROPRO's Wordstar Professional	£310 (a)
ASHTON TATE's DBASE II	£310 (a)
SUPERCALC II	£195 (a)

Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** *comment on their use with other DFS systems.*

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£41 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)

WORD PROCESSORS

VIEW 2.1	£37 (d)
VIEW 3.0	£56 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£7 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
WYSIWYG PLUS	£21 (d)
SPELLMASTER	£49 (d)
INTERWORD (If you own a WW+ then quote your reg number and pay £39).	£46 (d)
WORDEASE	£24 (d)
SPELLCHECK III	£31 (d)
EDWORD II	£43 (c)

SPREADSHEETS

VIEWSHEET	£41 (d)
WINDOWMATIC	£15 (d)
VIEWPLOT	£22 (d)
INTERSHEET	£39 (d)
INTERCHART	£27 (d)
ULTRACALC	£52 (d)
MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version For Master, Compact, B+ & B	£48 (c)

LANGUAGES

META ASSEMBLER	£145 (b)
TEAM DISASSEMBLER	
MACROM	£33 (d)
ACORN MICRO PROLOG	£62 (d)
ISO-PASCAL	£51 (c)
ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
OXFORD PASCAL (40 or 80T) Specify B or B+	£36 (d)
OXFORD PASCAL for Master	£52 (d)
ACORN LOGO	£46 (c)
LOGOTRON LOGO	£55 (c)
BBC PUBLICATIONS OPEN LOGO	£59 (c)
ACORN LISP ROM	£43 (d)
ACORN FORTH ROM	£39 (d)
ACORN COMAL ROM	£43 (d)
MICROTEXT	£52 (c)
MICROTEXT PLUS	£229 (b)

COMMUNICATIONS

TERMULATOR	£25 (d)
COMMSTAR II	£28 (d)
COMMUNICATOR	£49 (d)
MODEM MASTER	£11 (d)
COMMAND (Specify modem type)	£34 (d)
MASTER TERMULATOR	£34.75 (d)

COMPACT
(all on 3½" disc)

ARTROOM	£27 (d)
FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
MACROM	£37 (d)
BETABASE	£27 (d)
WHITE KNIGHT MKII	£16 (d)
BBC PUBLICATIONS BUNDLED SOFTWARE	£18.50 (d)

UTILITIES

ACCELERATOR	£49 (d)
ACORN BASIC EDITOR	£24 (d)
MONITOR (BBC Pub)	£34 (a)
BROM PLUS	£26.50 (d)
SLEUTH	£23 (d)
TOOLKIT PLUS	£31 (d)
TOOLBOX 2 (BBC Pub) Manual Cassette	£9.50 (d) £9 (d)
ACORN GXR GRAPHICS ROM specify B or B+	£24(d)
PRINTMASTER	£24 (d)
PRINTWISE	£24 (d)
DUMPMASTER	£26 (d).
FONTWISE PLUS	£17 (d)
HERSHEY FONT CHARACTER GENERATOR	£18 (d)
ICON MASTER	£29 (d)
MOVIE MAKER Two Roms + Cassette	£26 (d)
ADV TELETEXT UTILITIES ROM	£7.95 (d)

BBC PUBLICATIONS EDUCATIONAL SOFTWARE

A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

PRIMARY EDUCATION

ASTRONOMY	£11 (d)
COMPUTERS AT WORK	Aud/EC/disc£16 (c)
PICTURE CRAFT	Disc£17 (d)
INTRODUCING GEOGRAPHY	Disc£16 (d)
MATHS WITH A STORY 1	Cass£8 (d)
MATHS WITH A STORY 2	Cass£8 (d)
NUMBER GAMES	Cass/EC£7.50 (d)
USING YOUR COMPUTER	Cass£24 (c)

SECONDARY LEARNING

TECHNOLOGY & DESIGN Pt1	£21.50 (c)
ELECTRIC FIELDS	£10.50 (d)
ADVANCED LEVEL STUDIES: STATISITICS	Disc£23 (d)
ADVANCED STUDIES: GEOGRAPHY	Cass£10 (d)
INSIDE INFORMATION	Prog Cass£10 (d) Audio Cass£5 (d) Book£8 (d)
SCIENCE TOPICS (ST)	
S.T.:WAVES	Disc£14 (d)
S.T.:RELATIONSHIPS	Disc£14 (d)
S.T.:BONDING	Disc£14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	Disc£14 (d)
S.T.:ELECTRONICS IN ACTION	Disc£14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc£19 (d)
S.T.:ECOLOGY	Disc/EC£19 (d)
S.T.:POLYMERS	Disc/EC£19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc£20 (d)
S.T.:FOOD & POPULATION	Disc£20 (d)
SEC.SCIENCE MICROTECHNOLOGY	Cass£7 (d)
SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC£16 (c)

GENERAL

VU-TYPE PROFESSIONAL	Disc£19 (d)
WHITE KNIGHT MK II (for compact)	Disc£16 (d)
BATTLEFIELDS	Cass£8.50 (d)
A VOUS LA FRANCE	Cass/EC£17 (d) Book£5.25 (d) Audio Cassettes (2) £7.50 (a)
Additional charges for discs	£9.00 (d)
DEUTSCH DIREKT	Disc/aud/EC£16 (c) Book£5.95 (d)
MODEM MASTER	£11 (d)

Cassette based programs listed above can be supplied on disc at an extra charge of £1.50 per disc and please specify the format required 40 or 80T.

TECHNOLINE
(24 hr viewdata system)
Tel:01-450 9764

MAIL ORDER
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Telex:922800

RETAIL SHOPS
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Tel:01-208 1177 Telex:922800
(close to Dollis Hill ⊖)
West End Branch
305 Edgware Road, London W2
Tel:01-723 0233
(near Edgware Road ⊖)

For fast delivery telephone
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using VISA/Acess Card

Orders welcome from
government depts &
educational establishments

All prices ex VAT.
Prices are subject to
change without notice
Please add carriage
(a) £8.00 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:

8143 RS232	£30 (d)
8148 + RS232 + 8K	£65 (d)
8165 IEEE + Cable	£65 (d)
8132 Apple II	£60 (d)
8177P NLQ for FX80 + /FX100 +	£99 (d)

Parallel & Serial Buffers of various size also available.

FX80/80 + /85 Tractor Attachment	£29 (c)
LX80/86 Tractor Feed	£21 (c)
LQ800 Tractor Feed	£47 (b)
LQ1000 Tractor Feed	£52 (b)
EX800/1000 Colour option	£59 (b)
HI80 HP GL Emulation Rom + Ram	£63 (c)
HI80 Printer Emulation Rom	£38 (c)

SHEET FEEDERS:

8338 LX80	£52 (b)
8333 FX100 + /105	£169 (a)
8331 FX80 + /85	£129 (b)
LQ800	£135 (b)
LQ1000	£179 (b)
EX800	£135 (b)
EX 1000	£309 (b)
FX 800	£135 (b)
FX 1000	£179 (b)

Ribbons:

RX/FX100/100 + . FX105	£7 (d)
RX/FX80/80 + , FX85	£4 (d)
LX80	£4.50 (d)
LQ800	£8.50 (d).
LQ1000	£10 (d)
EX800/1000	£7.50 (d)
H180 Pen Set (Aqueous/Ball point)	£8.25 (d)

Dust Covers:

FX80	£5.50 (d)
TAXAN/Canon KP810	£6 (d)
FX100	£7.50 (d)
KP910	£7 (d)

HITACHI 672 Plotter

Aqueous Pen Set six pens	£18.50 (d)
Oil Based Pen Set six pens	£25.00 (d)

TAXAN CANON Accessories:

RS232 + 2K interface	£63 (d)
Ribbon, KP810/815/910/915	£6 (d)

Star Printer

NL10 Sheet Feeder	£52 (b)
NL10 RS232 Interface	£69 (c)
NL10 IBM Type Interface	£39 (c)
NL10 Ribbon	£4.50 (d)

National Panasonic KX P1080/81

Spare Ribbon	£4.50 (d)
Serial Interface	£39 (c)
KXP3131 Tractor	£90 (a)
KXP3131 Sheet Feeder	£189 (a)

JUKI 6100

RS232 Interfaces	£65 (d)
Tractor Feed	£149 (a)
Ribbon (Carbon)	£2.00 (d)
Spare Daisy Wheel	£14 (d)
Sheet Feeder	£219 (a)

BROTHER HR20

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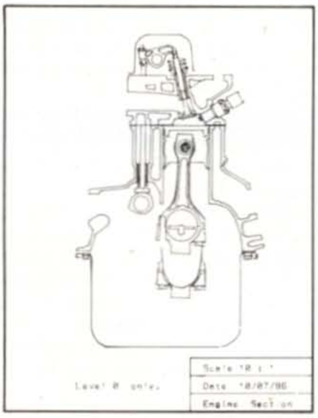

NOVACAD package includes a 16K ROM, Utility disc and a comprehensive manual.

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- **Any BBC range computer with Acorn DFS.**
- **40 Track single sided single drive.**
- **Epson compatible dot matrix printer.**

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

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Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using native mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
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PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512).

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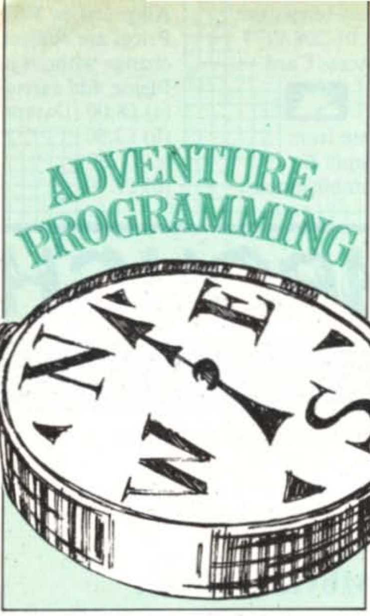


The Basic adventurer

Pete Gerrard begins a new series on learning Basic by writing adventure games

IS it possible for anybody to sit down in front of a computer and write a program? Within reason, yes. But is it possible for any old soul to sit down in front of a computer and produce a saleable, decent program? The answer to that one has sadly got to be no.

This series will demonstrate step by step all the programming routines and skills to write a big program in BBC Basic. So, if you have a spark of creativity lurking away in there somewhere, and you've always wanted to learn how to write programs for yourself, read on.

The program chosen could have been almost any that was large enough to contain a fair sprinkling of commands and routines that would help to familiarise you with BBC Basic, but what we've finally selected is an adventure.

Hopefully by the time we come to the end of this series you will be a competent programmer in BBC Basic – and you will have written an adventure program for yourself.

Adventure-writing utilities exist, but there you are simply using the programming skills of someone else and doing very little of the work yourself. Within the framework of this series you will be doing the work, and the result will reflect your style of programming just as much as it will reflect mine.

I can provide the hints and tips, you can alter them to produce your own, unique, adventures. In other words, I will provide you with a map of how to get from A to B, but whether you go via C or Z is up to you.

But before we start programming it's worth taking a closer look at adventures.

In the beginning was Colossal Cave, Crowther and Wood, and mainframe computers. Now there is no idea, you and me, and a BBC Micro. We won't worry about where the ideas for adventure games come from, that's your department anyway.

You might write about something as ordinary as a trip to the shops to buy a can of baked beans, or set forth into Middle Earth and do battle with trolls and dwarves with strange names.

What I'll concentrate on is the structure of the half-a-dozen items essential to the operating of a good adventure game and how to program them.

And how to start off with a blank sheet of paper, a lot of empty memory in the computer and end up with a vast amount of indecipherable scrawl and a computer bursting at the seams with coding.

We will learn about programming, and we will learn about adventures. But where, precisely, do we begin?

The idea, as I've said, is your problem, but we can do quite a bit of work without actually thinking about the game at all.

Well, we have to think text adventure, but that's about it. No graphics, since BBC Micros, graphics and memory are not entirely compatible. We are going to be aiming for text, and lots of it.

The first serious step is to rid yourself of the notion that this is going to be hard work.

A lot of the effort with writing adventure games involves just a slog, writing the boring stuff that has to be done, and without which the program will not operate. A degree of intelligence helps, but imagination is more important.

Think about the adventure games that you've played or read about. How do they operate? How do they work? Basically, like this:

1: Tell the player where he is.
2: Tell the player what he can see.
3: Tell the player where the exits are (possibly).
4: Ask him what he wants to do next.
5: Let him type something in.
6: Analyse it.
7: Act on result.
8: Branch to 1) if required, otherwise 4).

Simple really isn't it? To put it in programming terms, we might have something like this :

```
REPEAT
PROCwhere
PROCwhat
PROCexits
REPEAT
PROCwhatnext
PROCinput
PROCanalyse
PROCrespond
UNTIL newlocation<>oldlocation
UNTIL FALSE
```

That is all an adventure really does, in half a dozen or so easy steps. Unfortunately 11 lines of code are not going to get us very far, and we ought to look at each section in slightly more detail.

It prepares you for the awesome task of sitting down at the keyboard and actually typing something in. But don't worry at this stage about the programming aspect of it.

The Where routine brings up the description of the player's current location in the game, and since this is a text-only game we want that description to be as long and as detailed as possible.

So some form of text compression is needed; my third article will be looking at that – how to squeeze as much text as possible into the smallest amount of memory.

Objects available to the player are quite often described on the screen, so that he can get some sort of idea about the number of items that he can manipulate.

Similarly with exits, a player is sometimes told where he can go to – reasonable enough, because if you were actually in the adventure world rather than sitting in front of the computer you would be able to see a low tunnel heading north, or whatever.

Some programs print up the words "What next?" as a prompt to the player, others just use a symbol. Whatever is used, program control is now going over to the player to let him try to solve a problem, move, and so on.

A separate routine is called into play to accept and analyse the player's input. This forms what is referred to as a parser, and is possibly the most important thing in an adventure game.

If the program cannot respond to a reasonable request from the player then it is not going to be played for long.

Needless to say, this will be the longest part of the entire program, since a large vocabulary and a lot of problems to solve will be the ingredients of a good game, and acting on that vocabulary will take quite a lot of code.

Most of it will be fairly straightforward, however, telling players that they can't eat castles, can't drink horses, can't climb dwarves, or any of the other million and one things that people will type in when the going gets desperate.

You cannot write an adventure game without a map drawn on paper somewhere. If you try you will probably triple the time taken to write the game as you seek to eradicate all the bugs that will have appeared because the program (and you) don't know where the player is at any given time.

Again, you don't need to know what the game will be about. I usually sit down with a blank sheet of paper and a pen, and draw on it a series of numbers from one to however many locations my adventure is going to have.

The game used throughout this series started off with about 50 locations and ended up with rather more than 60. It's easy enough to add them on as the game progresses. You might end up with something looking like the map held by the spectral figure on the right.

The lines tell you which locations lead where. In this example 1 goes south to 2, which in turn goes south to 3 or north to 1; 3 then leads east to four or north to 2, and so on.

This, of course, assumes that north is at the top of your sheet of paper, east to the right, south to the bottom and west to the left, and that you're not using some totally convoluted system involving port and starboard or some other such idea.

Once we have our 60, 70, 100, or whatever, locations drawn up on a map and numbered we have to set problems for the player to solve, for an adventure without any problems is a bit like a book with blank pages. Once again it isn't necessary to know what the finished game will be about.

Look at the figure again. Location 3 looks like a good place to set a trap for the unwary, so circle it on your map. Location 5 looks like another good place, because the player won't be able to progress into the locations beyond until the problem there has been solved. Circle that as well.

I tend to aim for a problem roughly every three or four locations, although some locations do have more than one problem in them. This way the player can explore an area without getting bogged down as soon as he solves one problem.

If you start off with the problems few and far between and increase the frequency as the game wears on (always a good idea, saving the major conundrums towards the end) the player will feel compelled to return to play it time and time again.

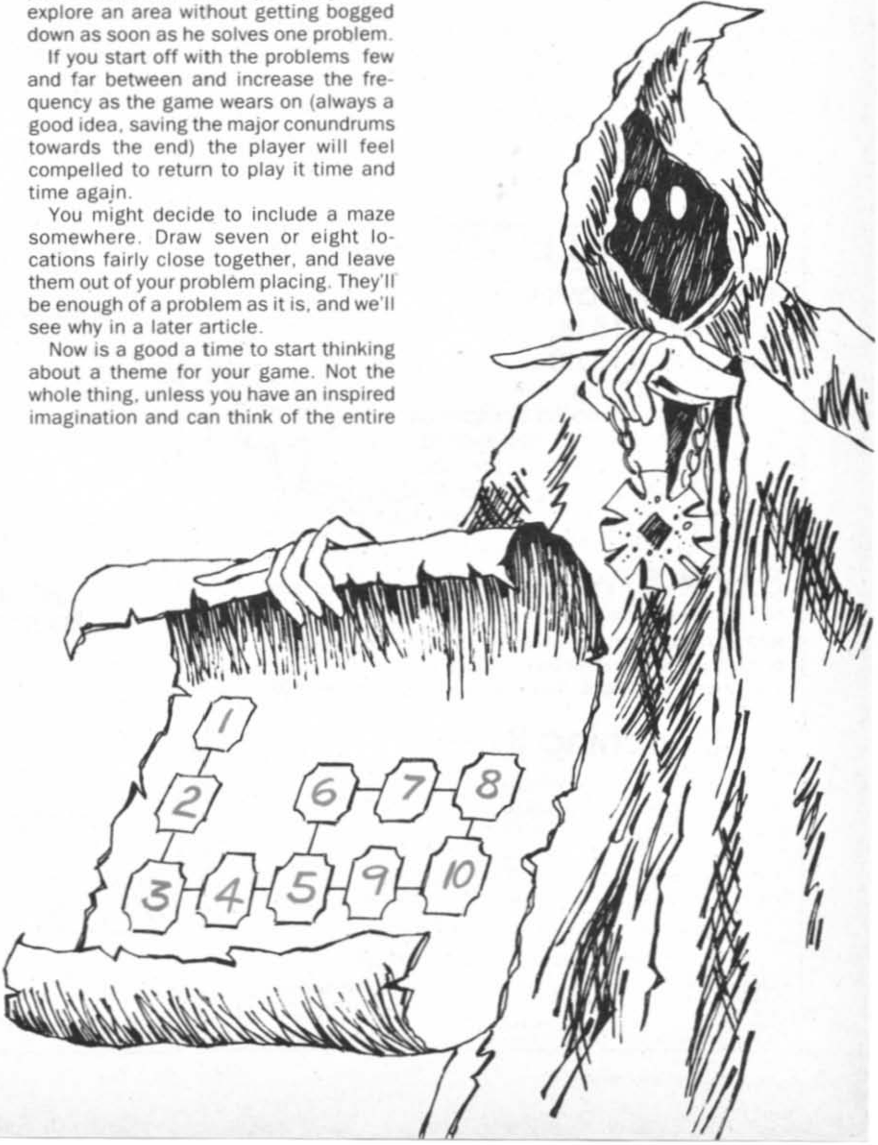
You might decide to include a maze somewhere. Draw seven or eight locations fairly close together, and leave them out of your problem placing. They'll be enough of a problem as it is, and we'll see why in a later article.

Now is a good a time to start thinking about a theme for your game. Not the whole thing, unless you have an inspired imagination and can think of the entire plot straightaway. No, something rather more simple, like "This will be a cowboy adventure", "This will be a mythical adventure" and so on.

Having done that, back to the map. Locations 5 to 10 look like a reasonable group of places, separate from the rest and self contained.

Assume we're going to do a Wild West scenario. The game will take place in a town, so they can be the saloon area, and locations 1, 2, 3 and any others that run down the centre of the map can be the main street.

Branches off to either side can also be



◀ *From Page 91*

labelled general stores, hotel, casino, or whatever. Your map will soon take shape, and as you label areas, ideas for problems will start to come to mind.

Perhaps the player cannot enter the saloon until he has some money. Where does he get the money from? Perhaps he cannot enter the hotel until he has a reservation booked for him. How does he reserve a room without telling anyone who he is?

It won't be long before the complete map unfolds in front of you, neatly or not, labelled with all its different areas, problems ringed and identified, mazes sorted out, and almost ready to start.

Having established some of the problems, you can then start thinking about objects to go with them. The saloon becomes an object, so does money, the hotel, the clerk on reception, and so on.

This list of objects will go a long way towards establishing the adventure's vocabulary, but along with a list of objects you'll need a list of verbs.

Most adventures understand LOOK, TAKE, DROP and so on, and you'll soon discover in your adventure writing career that the same 30 or so verbs occur in each game.

Others are obviously dictated by the game in question. ENTER SALOON, BUY DRINK, RESERVE ROOM will all add to the list. As with the original map, it's easy enough to add things on, so don't fight shy.

Use as large a vocabulary as you think the game will need, you can always amend it later.

And remember to use synonyms so that the program understands GET as well as TAKE, or FIGHT and ATTACK as well as BATTLE. It makes things easier for the player, and it makes your finished game look a lot more polished too.

With a map, a list of problems, and a tentative vocabulary, we are in a position to start coding. It doesn't matter if the map is incomplete and you haven't identified all the problems, or your vocabulary list consists of about four or five words. We will add and modify as we progress; it's easy to do.

What we've considered so far are the beginnings. We can make very little further progress without the computer, but the map can be refined or redrawn more neatly (it will still need changing as we go along), the problems sorted out and so on.

This can all be done while the computer is being hogged by someone else, so that when it comes round to your turn (kids in bed, parents in the pub, friends gone home, or whatever) you've got a pretty good idea of where to begin.

Linger over your cup of coffee, doodle on the map, because when this relaxing period is over there's a lot of coding to do. And if you've never written a BBC Basic program in your life, or at least never extended beyond the giddy heights of:

```
10 PRINT "MY NAME IS PETE":GOTO 10
```

don't panic. All will be explained slowly and carefully, and if we by sheer chance manage to get an adventure game out of it as well, all to the good.

● *Next month we'll concentrate on creating a parser for adventure programs.*

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All is not lost...

Wim van der Vaart rescues those programs the BBC Micro can't run

WE'VE all seen it: One minute you are happily running your program and then: Bad program. Or else you're loading your file from tape, find it's recorded over a dip and no amount of rewinds can recover the lost data block.

It is possible to read lost tape programs, complete with errors, by using the *OPT2 command. Although it is in memory, the message Bad Program is then unavoidable so you still don't have access to your program.

Our Repair program deals with all these problems. It is a machine code routine that traces the reasons causing the bad program message and eliminates them.

Afterwards the Basic program can be listed and edited again, although it will contain some errors. However tracing them is easy, because Repair reports the lines it has found and corrected.

Type in the listing, using the checksums to ensure that you have not made any errors. Save it as B.Repair and then RUN it.

The repair routine is assembled into pages &B00 and &C00, and you can save it by copying the SAVE command which is displayed when assembly is complete.

Once you have saved the routine you can test it by typing PROCcorrupt followed by Return. This procedure deliberately corrupts the program; if you then type OLD or LIST you should get a Bad program message. If not call PROCcorrupt again.

Once you've got the Bad program message, type CALL&B00 and press Return. You will see a list with the memory addresses of each line of the program on the left, line numbers in the middle and any corrections done to the line on the right. Each * is the correction of one character.

A failed link means that the byte of a Basic line which gives the length of the line was corrupted and an attempt to correct it has been made. You can now LIST the program.

Several special conditions can occur after a repair. Strange line numbers might pop up. You cannot delete them, but renumbering the program solves this. Sometimes the corruption causes the program to appear to terminate early, and this effect is removed by typing ?(TOP–1)=0 and then re-running the Repair program.

Once saved, you can call up Repair from tape or disc at any time with *repair or *run repair. And you need never suffer from a totally lost program ever again. ■

```
100 REM ==================
110 REM Bad Program Repair
120 REM   by W.v.d.Vaart
130 REM (c) The Micro User
140 REM ==================
150 oswrch=&FFEE
160 osnewl=&FFE7
170 page=&18
180 line=&70
190 leng=&72
200 cont=&73
210 lnum=&74
220 dlnm=&76
230 txtp=&7B
240 FOR L%=0 TO 2 STEP 2
250 P%=&B00
260 [OPT L%
270 .start
280  LDA #14
290  JSR oswrch
300 .repair
310  LDA page
320  STA line+1
330  LDY #0
340  STY line
350  LDA (line),Y
360  CMP #&0D
370  BEQ header
380  LDA #&0D
390  STA (line),Y
400  JSR osnewl
410  OPT FNtext("No CR at PAGE")
420  JSR osnewl
430 .header
440  JSR osnewl
450  OPT FNtext("Addr  Line Error")
460  JSR osnewl
470  LDA #0
480  STA cont
490 .newline
500  JSR osnewl
510  BIT &FF
520  BMI escape
530 \print address
540  LDA line+1
550  JSR hexout
560  LDA line
570  JSR hexout
580  JSR pspace
590  LDY #1
600  LDA (line),Y
610  CMP #&FF
620  BEQ end
630 .lnumber
640  JSR prlnum
650  JSR pspace
660  LDY #1
670  LDA (line),Y
680  BPL lengbyte
690  AND #&7F
700  STA (line),Y
710  OPT FNtext("Token  ")
720 .lengbyte
730  LDY #3
740  LDA (line),Y
750  BEQ failedlink
760  TAY
770  LDA (line),Y
780  CMP #&0D
790  BNE failedlink
800  STY leng
810  JSR control
820  LDA #0
830  STA cont
840 .newaddr
850  LDA leng
860  CLC
870  ADC line
880  STA line
890  BCC newline
900  INC line+1
910  JMP newline
920 .end
930  LDA #15
940  JSR oswrch
950  JMP osnewl
960 .escape
970  JSR end
980  BRK:OPT FNequb(17)
990  OPT FNequs("Escape"+CHR$0)
1000 .failedlink
1010  OPT FNtext("Failed Link  ")
1020  LDY #4
1030 .scan
1040  LDA (line),Y
1050  CMP #&0D
1060  BEQ repairlink
1070  INY:CPY #&FF
1080  BNE scan
1090  LDA cont
1100  CMP #2
1110  BEQ force
1120  INC cont
1130  OPT FNtext("No CR found  ")
1140  LDY #&FF
1150  LDA #&0D
1160  STA (line),Y
1170 .repairlink
1180  STY leng
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

Turn to Page 94 ▶

◀ **From Page 93**

```
1190  TYA
1200  LDY #3
1210  STA (line),Y
1220  JSR control
1230 JMP newaddr
1240 .force
1250  LDA #&FF
1260  LDY #1
1270  STA (line),Y
1280  OPT FNtext("Forced End")
1290  JMP end
1300 .control
1310  LDY #4
1320 .loop
1330  CPY leng
1340  BNE check
1350  RTS
1360 .check
1370  LDA (line),Y
1380  CMP #&20
1390  BCS next
1400  LDA #ASC"*"
1410  STA (line),Y
1420  JSR ptext
1430  OPT FNequs("*")
1440 .next
1450  INY:JMP loop
1460 .prlnum
1470  LDY #1
1480  LDA (line),Y
1490  STA lnum+1
1500  INY
1510  LDA (line),Y
1520  STA lnum
1530  LDX #&04
1540 .cleardec
1550  LDA #&00
1560  STA dlnm,X
1570  SEC
1580 .contdec
1590  LDA lnum
1600  SBC LSBtable,X
1610  TAY
1620  LDA lnum+1
1630  SBC MSBtable,X
1640  BCC nextdec
1650  STA lnum+1
1660  STY lnum
1670  INC dlnm,X
1680  JMP contdec
1690 .nextdec
1700  DEX
1710  BPL cleardec
1720  LDX #&04
1730 .plspc
1740  LDA dlnm,X
1750  BNE pdec
1760  JSR pspace
1770  DEX:BNE plspc
1780 .pdec
1790  LDA dlnm,X
1800  JSR nybble
1810  DEX:BPL pdec
1820  RTS
1830 .LSBtable
1840  OPT FNequb(1MOD256)
1850  OPT FNequb(10MOD256)
1860  OPT FNequb(100MOD256)
1870  OPT FNequb(1000MOD256)
1880  OPT FNequb(10000MOD256)
1890 .MSBtable
1900  OPT FNequb(1DIV256)
1910  OPT FNequb(10DIV256)
1920  OPT FNequb(100DIV256)
1930  OPT FNequb(1000DIV256)
1940  OPT FNequb(10000DIV256)
1950 .ptext
1960  PLA:STA txtp
1970  PLA:STA txtp+1
1980  TYA:PHA
1990  LDY #0
2000 .getch
2010  JSR incp
2020  LDA (txtp),Y
2030  CMP #&0D
2040  BEQ eot
2050  JSR oswrch
2060  JMP getch
2070 .eot
2080  PLA:TAY
2090  JSR incp
2100  JMP (txtp)
2110 .incp
2120  INC txtp
2130  BNE rts
2140  INC txtp+1
2150 .rts RTS
2160 .hexout
2170  PHA
2180  LSR A:LSR A
2190  LSR A:LSR A
2200  JSR nybble
2210  PLA
2220 .nybble
2230  AND #&0F
2240  CMP #&0A
2250  BCC pdigit
2260  ADC #&06
2270 .pdigit
2280  ADC #&30
2290  JMP oswrch
2300 .pspace
2310  LDA #&20
2320  JMP oswrch
2330 ]:NEXT
2340 PRINT"Save code with:"
2350 PRINT" *SAVE REPAIR B00 ";~P%
2360 END
2370 DEF FNequb(B%)
2380 ?P%=B%:P%=P%+1:=L%
2390 DEF FNequs(s$)
2400 $P%=s$:P%=P%+LENs$+1:=L%
2410 DEF FNtext(s$):[OPT L%
2420 JSR ptext:]:=FNequs(s$)
2430 DEF PROCcorrupt
2440 Z%=RND(-TIME)
2450 FOR X%=1 TO 2000
2460 Y%=RND(TOP-PAGE-70)
2470 Y%?PAGE=RND(256)
2480 NEXT:ENDPROC
```

Get it right!

```
100 =    0 0 | 500 = 3334 6 |  900 = B9CF A
110 =    0 0 | 510 = 8F89 1 |  910 = 2B63 8
120 =    0 0 | 520 = D917 5 |  920 = E188 7
130 =    0 0 | 530 =    0 5 |  930 = E085 6
140 =    0 0 | 540 = 1B81 E |  940 = 9224 A
150 =   78 8 | 550 = 3C0E 6 |  950 = 9C1B 4
160 = FE7F 3 | 560 = DB75 D |  960 = E93C 7
170 = B653 A | 570 = 3C0E 3 |  970 = 82B5 5
180 = 6AB1 8 | 580 = D710 1 |  980 = 5977 7
190 = 5C1B 9 | 590 = 8CD0 9 |  990 = E94E 5
200 = 8C3E 5 | 600 = 54D7 E | 1000 = 8D5F E
210 = E87A D | 610 = 66FF 2 | 1010 = 5879 D
220 = 6F27 6 | 620 = 68AF 9 | 1020 = DC75 5
230 = 239B 4 | 630 = DA37 6 | 1030 = 69FD A
240 = AAB9 6 | 640 = 2D38 E | 1040 = 54D7 C
250 = E1D6 C | 650 = D710 9 | 1050 = E442 F
260 = 1EF3 0 | 660 = 8CD0 8 | 1060 = 19E4 9
270 = 3208 F | 670 = 54D7 8 | 1070 = F946 B
280 = F0A4 C | 680 =  566 A | 1080 = 1956 1
290 = 9224 E | 690 = F060 1 | 1090 = BF2B 3
300 = A960 B | 700 = 2559 8 | 1100 = 22BB 0
310 = 9CD9 5 | 710 = BEEB 1 | 1110 = CD59 4
320 = 8A58 3 | 720 = 2937 D | 1120 = 8F9B 6
330 = 9CF1 A | 730 = AC92 F | 1130 = 49EA B
340 = 1FBE 8 | 740 = 54D7 8 | 1140 = DC13 7
350 = 54D7 0 | 750 = F023 6 | 1150 = 4968 9
360 = E442 8 | 760 = 772F B | 1160 = 2559 B
370 = CCD2 3 | 770 = 54D7 2 | 1170 = 6498 1
380 = 4968 B | 780 = E442 B | 1180 = 4A9D A
390 = 2559 6 | 790 =  E58 2 | 1190 = 6ECC F
400 = 3334 9 | 800 = 4A9D 9 | 1200 = AC92 0
410 = 7CC2 2 | 810 =  FA6 9 | 1210 = 2559 A
420 = 3334 3 | 820 =  295 D | 1220 =  FA6 7
430 = F668 D | 830 = 6C26 6 | 1230 = DDA9 9
440 = 3334 1 | 840 = F356 1 | 1240 = 38DC 9
450 = 22EF C | 850 = 8E56 2 | 1250 = CBD5 5
460 = 3334 D | 860 = 74FB A | 1260 = 8CD0 6
470 =  295 A | 870 =  651 3 | 1270 = 2559 0
480 = 6C26 C | 880 =  878 F | 1280 = EA44 7
490 =  59C 7 | 890 = CEA3 2 | 1290 = 5C11 1
```

```
1300 = 4A5C 1 | 1700 = E8A9 8 | 2100 = 9005 1
1310 = DC75 D | 1710 = B35E 6 | 2110 = CD3D 7
1320 =  325 9 | 1720 = 6599 7 | 2120 = AFDE 6
1330 = B6EF D | 1730 = 6B09 D | 2130 = 6ECC 3
1340 = B80C 1 | 1740 = F82D F | 2140 = DB9D 5
1350 = 9843 2 | 1750 = 1A73 F | 2150 = 1E9F A
1360 = 6D9B 4 | 1760 = D710 4 | 2160 = 8DFC 8
1370 = 54D7 8 | 1770 = B83E 5 | 2170 = 824E 3
1380 = BC33 B | 1780 = 6AD8 5 | 2180 = 877D 1
1390 = FE28 C | 1790 = F82D 3 | 2190 = 877D E
1400 = 378E D | 1800 = B438 8 | 2200 = B438 B
1410 = 2559 9 | 1810 = FD70 D | 2210 = 4E8A 8
1420 = 5656 E | 1820 = 9843 8 | 2220 =  5CA D
1430 = 8BFF E | 1830 = DC00 4 | 2230 = 69F7 E
1440 = F3EC F | 1840 = C254 E | 2240 = B4E7 0
1450 = E679 C | 1850 = B256 3 | 2250 = 60E7 E
1460 = 9CCA C | 1860 = CEC1 1 | 2260 = CA99 4
1470 = 8CD0 B | 1870 = E6DA 9 | 2270 = B2C7 B
1480 = 54D7 1 | 1880 = 58B0 7 | 2280 = FF0C 5
1490 = 4195 1 | 1890 = 9BD3 2 | 2290 = 3D0B 6
1500 = 6623 C | 1900 = 86D7 6 | 2300 = 66E2 C
1510 = 54D7 D | 1910 = F6D5 0 | 2310 = 1119 1
1520 = D369 C | 1920 = 8A42 E | 2320 = 3D0B 2
1530 = 6599 F | 1930 = A259 3 | 2330 = DA42 B
1540 = 9F0F 1 | 1940 = 1C33 0 | 2340 = 95B5 4
1550 = 777B 4 | 1950 = EFD1 9 | 2350 = 232D 1
1560 = 69F4 9 | 1960 = 17AA 0 | 2360 = FD2E 4
1570 = 8D00 7 | 1970 = 722A C | 2370 = 21B2 1
1580 = A5BB 3 | 1980 = 6E12 A | 2380 =  8D5 2
1590 =   64 C | 1990 = 9CF1 9 | 2390 = 4E1D 3
1600 = F364 F | 2000 = 992B B | 2400 = 2AD1 E
1610 = 772F 0 | 2010 = ACF8 C | 2410 = 8552 7
1620 = D04C 2 | 2020 = 4A33 D | 2420 = 7B70 7
1630 = 9C21 3 | 2030 = E442 A | 2430 = ED7D 9
1640 = CB53 5 | 2040 = 49AF E | 2440 =  4E1 B
1650 = 4195 2 | 2050 = 9224 6 | 2450 = 2776 A
1660 = C4AF 4 | 2060 = E3EA B | 2460 = 2C0A B
1670 = 5A63 B | 2070 = C088 1 | 2470 = 45CF 0
1680 = 8B44 E | 2080 =  330 4 | 2480 = E531 7
1690 =   6C 0 | 2090 = ACF8 4 |
```

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When finished, another keystroke makes GENIE vanish, immediately dropping you back to EXACTLY what you were doing, before you called GENIE.

GENIE is a totally self-contained system requiring no access to disk, it is present in your computer from the moment you switch on.

THE SOFTWARE

The GENIE System software—32K of machine code—has an original screen display, using high resolution windows with up to 7 colours on screen, AND 80 column text display. The screen colours are user selectable to give optimum clarity on any monitor.

GENIE provides; a 10 digit calculator with memory, a 100 year calendar, address book, desk diary, notepad and phone book. Information can be accessed by browsing, or by fast search techniques. The notepad is a mini-wordprocessor with word-wrap, and full cursor editing.

GENIE can produce address labels, and pages of the diary notepad can be output to a printer.

In addition to these, stored in GENIE's memory are ASCII tables and lists of commonly used conversion factors eg metric to imperial units.

All the utilities in GENIE are MENU DRIVEN, making full use of cursor and function keys.

THE HARDWARE

GENIE 'lives' on a small circuit board only 3 inches square.

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Will Gallagher word processes his way to better Basic

The Basic process

WHEN the BBC Micro first appeared most people were satisfied with writing and editing Basic programs using the cursor and copy keys. But now there is an increasing tendency to turn to one of the many sophisticated software packages available for the BBC Micro to manipulate programs.

The most popular is the general word processor, where the swift drafting and correction of large pieces of text as well as the search and replace functions make them ideal for this sort of work.

As well as a general look at how you can use word processors and their advantages and problems, we are going to examine briefly View, Wordwise, Mini Office II and Interword, and see how well they serve a purpose for which they were not even designed. All references to Wordwise apply equally to Wordwise Plus.

The second of the two most widely used packages for program editing is the specific language editor. This is where a program has been written to take account of the peculiarities of a particular language, as with Acorn's Basic Editor for the model B which automatically inserts line numbers.

The language editor was developed when the convenience of using word processors became apparent, as can be easily seen with the latest business packages like Borland's Turbo Pascal with which users of the Master 512 and the Torch Graduate IBM-compatible machines may be familiar.

With both specific language editors and the word processing packages, you enter your program in very much the same way you do in normal Acorn Basic. You type in a line, press Return, and enter the next.

Except for the fact that with the word processors you do not need to enter line numbers unless you want to, the difference only becomes apparent when you make a mistake.

In normal Basic, you usually type AUTO at the start to avoid the continual entering of line numbers. So if you make a single typing mistake, and have gone on the next line before noticing it, you have to press Escape to cancel the Auto command and stop the line numbers being generated.

Then you have either to re-type the entire line, or use the cursor keys to go up to the offending line, copy it up to the point of the mistake, type the correction, move on to the next valid part of the line and then copy to the end.

Finally, of course, you have to re-enter AUTO to re-start the editing session, not forgetting to make the automatic line numbering facility start at the next line of your program, and not default back to 10.

With either a word processor or dedicated language editor you just move the cursor up to the mistake and either delete the error and type the correct version or just overwrite that part of the line with the new one.

That makes the correction of the syntax type of error extremely easy and rapid, but every programmer makes logical errors as well, and these are aggravating as you need to work out both what the problem is and what line number to make the correction or corrections in.

Word processing your programs can help the thought processes when you are programming because you can rapidly consult any part of your program by stepping up and down the text – but the real use here is in the insertion of the correct lines.

Moving the cursor to the right place, you can type the new code straight into the body of the text, and of course edit surrounding lines as described before. This technique allows you to build up your program by steps, ensuring each section works before moving on to the next.

Basic IV on the Master has a search function with the new LIST IF command, which can be used, for example, to search for procedure definitions with the command LIST IF DEFPROC. But even this option pales beside the choices available on any word processor.

Wordwise and Mini Office II allow search and replace functions from the main menu, and then prompt you through some of the options such as whether to search/replace globally or not – that is, whether to change every occurrence of the words you specify or whether to stop at each one and ask for confirmation of the change.

Both are geared to replace pieces of text, which can be very useful, for instance, changing every occurrence of PROCDEMO to a more readable PROCdemo, but one drawback is that even for simple searches for the start of PROCdemo you still need to specify what you want the string replaced by.

You could tell it to replace DEFPROCdemo with DEFPROCdemo, or more easily just hit Return at the Replace string prompt and Escape out when DEFPROCdemo is found. However this is clumsy and very risky; if you have entered the global option instead of the selective one you will find the reference to DEFPROCdemo has vanished.

Acorn's View word processor can split the search and replace functions into several separate commands, easing the programmer's work – and indeed that of the writer of normal text.

There are in fact three commands relating to this – the Search, Replace and Change. Search requires only one word after it, the word or phrase you want to find, and it will switch to the edit screen, positioning the cursor at the first occurrence of the phrase.

Control+f1 allows you to leap to the next occurrence and so on, allowing rapid movement through the program.

So far we have spoken of the convenience of writing Basic on editors such as word processors, language editors and the like. But how do you run these programs? Just as Basic does not have the editing facilities of a word processor, so a word processor does not have a language interpreter to run the program.

You need to convert between programs that Basic can run, and the program text editors can write. Language editors such as Acorn's Master Edit and Model B Basic Editor have fairly easy conversion methods.

On the Master, a program is saved in the Edit format by pressing f3, Save File, and converted to Basic format by Shift+f4, Return Language, which will also return you to the normal Acorn Basic mode and the > prompt. But this only works as long as the text and Basic versions of the program together occupy less than the available ram.

The Basic Editor for the BBC B is even simpler. As with most Acorn software packages, it has a command and an edit screen. Entering RUN at the command screen will take you into Basic and the

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program is run. You can also leave the Editor by typing Exit, but in both cases you should save your program first.

If you are using a word processor, Wordwise and Mini Office II are by far the easiest to use at this point. Imagine that you have entered your first draft program and you have not used line numbers.

At the top of your program text you type *BASIC Return and AUTO Return. Then save it using option 1 of Wordwise or the Save Ascii option of Mini Office II. Let's say it's called DEMO. Now, from the menu of either word processor just type *DEMO (or if you have DFS 0.9 *EXEC DEMO).

What happens next looks like magic. By *EXECing the program text it enters your micro from disc as if it were being typed from the keyboard. So the first thing that happens is the command *BASIC is performed, then the command AUTO, which switches on the automatic line numbering, and finally the program text appears.

When the program has finished loading you just type Escape as normal to exit from the automatic line numbering. When you run the program you will undoubtedly find errors you didn't notice, or perhaps you'll want to add or develop routines.

So having made a note of the changes, abandon the program and switch straight back to the word processor and load up the program text once again. This routine can be applied to Edit in the Master once the program becomes too big to switch directly between Basic and Edit.

View and Interword are more complicated because they do not store data in a pure Ascii format with the simple save routines – View does if you remember to disable formatting and justification by pressing Control+f2, Control+f3.

But you can use the Spool text option from Interword, remembering to switch off paging. And use the Write command instead of Save for View. Pure text can be loaded directly into Interword, and use Read from View.

One point that makes Interword the least useful word processor for this technique is that when using the Spool option every line has two spaces added to the end of it, which is 1k of wasted ram for every 500 lines of program. And if you reload the program and then Spool it again you add even more spaces. This is not a problem with the Master which removes these trailing spaces.

The final point on View and Interword is that they have a line length limit. In View this is just 132 characters. Beyond this point a line is split whether you want it or not. When the file is EXECed back into Basic the AUTO command will think that it is a new line.

So programming using editors and word processors is a lot more convenient than using Basic, but it is also an aid to better programming.

Line numbers become superfluous, and thus GOTO and GOSUB commands are eradicated. Structured programming practices are encouraged and enforced, and with the ability to readily cut and paste short sections of programs, libraries of robust procedures can be produced.

One of the few things you can say with any degree of certainty is that if you write a lot of code, you need an editor. ■

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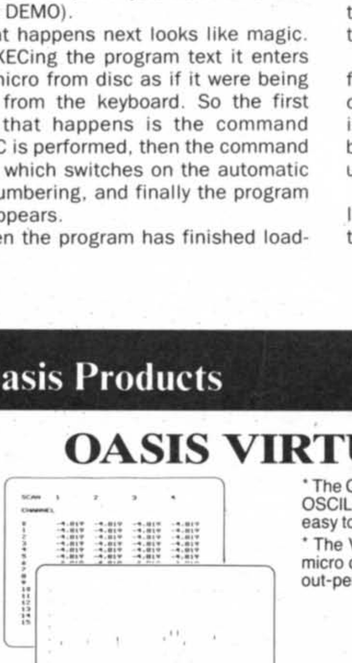

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Design Consultancy

Building Basic data

Convert bytes to Basic quickly with this utility

by Hugh Haskell

IT is sometimes necessary to convert a section of memory or a file into lines of data for use in a Basic program. This machine code utility very quickly converts from a file on disc into this form either as extra lines appended to your program, starting at 10 higher than your existing top line number, or as a program block starting at line number 10.

In either case the line numbers increase in steps of 10. If you have data in memory to convert, first *SAVE it before calling the utility.

Type in and save the Basic source program BASDAT and use the checksum listing to correct any of your typing errors. Run BASDAT and the code is assembled, respond Y to the choice Ready to save Y/N? and the code is saved under the name BDAT, then locked.

Note that a three pass assembly is used so that the code is automatically relocated as high in memory immediately below the screen as possible, thus creating the largest possible block of memory for program use.

To use the program type *BDAT or *RUN BDAT, giving a file name if the file is on the disc in the current drive. The file will then be accessed and the data lines produced.

If no name is given the program requests the file name – this gives the opportunity to change the disc if the required file is on another one.

If for any reason the file cannot be found an error message is printed and a new name requested. Pressing Escape allows the run to be aborted.

In the program the initialisation routine sets certain variables to zero and loads *BufPtr* with the address of *Buffer*.

Progchk checks the validity of the present Basic program and sets *Line_no* to the highest line number already used, or to zero in the absence of a valid program.

The routine uses Basic's own variable TOP as a pointer into the program. TOP is set first to PAGE and the line number to zero in routine *Top_Page*.

Next, every line of the program is checked for carriage return (&0D), two line number bytes and the length byte. If the first of the line number bytes is negative (that is greater than &80 but normally &FF) it is the program end marker instead.

If a line does not start with &0D or if the length byte is zero (or strictly, if it is less than five), the program is not valid. Otherwise, when the program end marker is found the program is good. If you have just typed NEW the end marker will be byte one of the program, immediately after the first &0D.

The start of the next line is found by adding the length byte to TOP. Each time round the checking loop the line number bytes are copied into the variable *Line no*.

If at any stage one of the possible errors is found, *Top_Page* is called again to reset *Line_no* to zero and TOP to PAGE.

Once this part is done the program is either good or absent. TOP is now increased so it points to the program end marker byte. The subroutine *Filename* is called to obtain the name of the file to be used for data.

First, a check is made on what was input with the command *BDAT. If a name was supplied it is moved into the buffer at &70. This is not the most elegant way of treating the input, but is chosen since it facilitates making a common routine for a rom-based version.

If no name was given this will be detected because &0D will be met when the index register Y is at 1. In this case the program jumps to a routine to read in a name from the keyboard to the same buffer.

When a file name is in the buffer, by either means, a call is made to *Osfind* to open the file. If this is successful the channel number is saved and a return is made to the main program. If the file is not found a prompt is printed to request another name. During input a check is made in case Escape is pressed.

Creation of the data lines works like this: *Newl* is called to set up the start of a line after first calling *Chekmem* to find out if there is still room.

The line number and line counter are incremented, poking the line number bytes into memory in the first and second bytes of the line, poking &DC, the token for data, and &20 for a space, in the fourth and fifth bytes. The third byte will be the line length byte when the length is known.

Osbget is used to read a byte from the file. If EOF has been reached a jump is made to the ending-off routine, otherwise the byte is converted into up to three Ascii characters which are added to the line in *build*.

A check is also made of the line length and when it exceeds the limit set, *Endofline* is called.

This puts in the &0D at the end of the line, pokes the length byte where it belongs and adds the line length to the current value of TOP, ready for the next line.

This cycle repeats until no more memory space is available or the end of the file is encountered, whereupon a jump to *End* is made if in the middle of a line, or *End1* if already at the end of the present line.

In the former case, Y is decreased to overwrite the comma which will already have been added and the *Endofline* routine is called. In both cases the program end marker &FF is poked after the end of the line and the file is closed.

The system variables LOMEM at location &00 and the heap pointer at &02 are then set to the new value TOP.

Finally a message is printed giving the number of bytes and lines added.

```
100 REM BASDAT V2.0
110 REM by Hugh Haskell
120 REM (c) The Micro User
130 Z%=HIMEM:HIMEM=Z%-&400
140 Name$="BDAT":DIM S% 20
150 Sx%=S% MOD256:Sy%=S% DIV256
160 Lomem      = &00:Heap       = &02
170 Top        = &12:Page       = &18
180 Line_no    = &5C:Linelen    = 30
190 Data       = &5E:hundred    = &5F
200 ten        = &60:unit       = &61
210 Index      = &62:Channel    = &63
220 Linecount  = &64:Bytecount  = &66
230 BufPtr     = &68:Pbuf       = &6A
240 Strvector  = &6C:Retvector  = &6E
250 Buffer     = &70:comline    = &F2
260 Code       = HIMEM
270 Osasci  = &FFE3:Osbget  = &FFD7
280 Osbyte  = &FFF4:Oscli   = &FFF7
290 Osfind  = &FFCE:Osnewl  = &FFE7
300 Osrdch  = &FFE0:Oswrch  = &FFEE
310 PROC_Assemble
320 PRINTSPC8"Ready to save Y/N?";
330 REPEAT A%=INSTR("YyNn",GET$)
340 UNTILA%:PRINT:IF A%>2 THEN END
350 $S%="*SAVE "+Name$+" "+STR$~bdat+"
"+STR$~P%:PRINT'$S%
360 X%=Sx%:Y%=Sy%:CALL Oscli
370 $S%="*ACC."+Name$+" L":PRINT$S%
380 X%=Sx%:Y%=Sy%:CALL Oscli:END
390 DEFPROC_Assemble
400 FORC%=0 TO2:B%=C% AND 2:P%=Code
410 [OPT B%:.bdat JSR Init
420 JSR Progchk:JSR Filename
```

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```
430 CMP #27:BNE Line:JSR Osnewl
440 LDA #&7D:JSR Osbyte:JMP Exit
450 .Line JSR Newl:BCS con0:.Bldln
460 JSR Gbyte:BCC con1:JMP End:.con1
470 JSR Countbytes:JSR Conv:LDX #0
480 .value LDA hundred,X:CMP #&20
490 BEQ con2:STA (Top),Y:INY:.con2
500 INX:CPX #3:BNE value
510 CPY #Linelen:BCS ret1
520 LDA #ASC",":STA (Top),Y:INY
530 JMP Bldln:.ret1 JSR Endofline
540 JSR Gbyte:BCC con3:JMP End1
550 .con3:JSR Newl:BCC con1:.con0
560 JSR Oprt:OPT FNequw(Message6)
570 JMP End1:.Init LDA #0
580 STA Linecount:STA Linecount+1
590 LDA #0:STA Bytecount
600 STA Bytecount+1:LDA #1
610 STA Index:LDA #Buffer DIV256
620 STA BufPtr+1:LDA #Buffer MOD256
630 STA BufPtr:RTS:.Progchk
640 JSR Top_Page:.loop1:LDA #13
650 CMP (Top),Y:STA (Top),Y:BNE Bad
660 INY:LDA (Top),Y:BMI Good
670 STA Line_no:INY:LDA (Top),Y
680 STA Line_no+1:INY:LDA (Top),Y
690 BEQ Bad:JSR IncTopA:LDY #0
700 BEQ loop1:.Bad JSR Top_Page
710 .Good:.IncTop1 LDA #1
720 .IncTopA:CLC:ADC Top
730 STA Top:BCC con4:INC Top+1
740 .con4:RTS:.Top_Page:LDA Page
750 STA Top+1:LDY #0:STY Top
760 STY Line_no:STY Line_no+1:RTS
770 .Filename LDY #LEN Name$:LDX #0
780 .loop2:LDA (comline),Y
790 STA Buffer,X:INY:CMP #32
800 BEQ loop2:INX:CMP #13
810 BNE loop2:CPY #LEN(Name$)+1
820 BNE Open:JSR Oprt
830 OPT FNequw(Message2)
840 .Input:LDY #0:.loop3:JSR Osrdch
850 CMP #27:BNE con5:RTS
860 .con5 CMP #&7F:BNE con6
870 CPY #0:BEQ loop3:DEY
880 JMP wrt:.con6 STA Buffer,Y
890 INY:.wrt JSR Oswrch:CMP #13
900 BEQ con7:JMP loop3:.con7
910 JSR Osnewl:.Open LDA #&C0
920 LDX #Buffer MOD256
930 LDY #Buffer DIV256
940 JSR Osfind:CMP #0:BEQ Error
950 STA Channel:RTS:.Error
960 JSR Oprt:OPT FNequw(Message1)
970 JMP Input:.Newl JSR Chekmem
980 BCC memok:RTS:.memok
990 JSR Incline_no:JSR Countlines
1000 LDY #0:.loop4 LDA Line_no,Y
1010 STA (Top),Y:INY:CPY #2
1020 BNE loop4:INY:LDA #&DC
1030 STA (Top),Y:INY:LDA #32
1040 STA (Top),Y:INY:CLC:.ret100
1050 RTS:.Chekmem LDA Top+1
1060 CMP #(Code-Linelen-7) DIV256
1070 BCC ret100:BNE ret100:LDA Top
1080 CMP #(Code-Linelen-7) MOD256
1090 RTS:.Countlines SED:CLC
1100 LDA Linecount:ADC #1
1110 STA Linecount:LDA Linecount+1
1120 ADC #0:STA Linecount+1:CLD:RTS
1130 .Incline_no CLC:LDA #10
1140 ADC Line_no+1:STA Line_no+1
1150 BCC ret:INC Line_no:.ret:RTS
1160 .Gbyte TYA:PHA:LDY Channel
1170 JSR Osbget:STA Data:PLA:TAY:RTS
1180 .Countbytes SED:CLC
1190 LDA Bytecount:ADC #1
1200 STA Bytecount:LDA Bytecount+1
1210 ADC #0:STA Bytecount+1:CLD:RTS
1220 .Conv TYA:PHA:LDY #&30:STY unit
1230 STY ten:STY hundred:LDA Data
1240 LDX #0:LDY #100:STY Index
1250 JSR Divide:LDY #10:STY Index
1260 JSR Divide:CLC:ADC unit
1270 STA unit:LDA hundred:CMP #&30
1280 BNE ret2:LDA #&20:STA hundred
1290 TAX:LDA ten:CMP #&30:BNE ret2
1300 STX ten:.ret2 PLA:TAY:RTS
1310 .Divide CLC:CMP Index:BCC out1
1320 SBC Index:INC hundred,X
1330 JMP Divide:.out1 INX:RTS
1340 .Endofline LDA #13:STA (Top),Y
1350 INY:TYA:LDY #2:STA (Top),Y
1360 JSR IncTopA:RTS:.End DEY
1370 JSR Endofline:.End1 LDY #0
1380 LDA #&FF:STA (Top),Y:LDA #0
1390 LDY Channel:JSR Osfind
1400 JSR IncTop1:LDA Top:STA Lomem
1410 STA Heap:LDA Top+1:STA Lomem+1
1420 STA Heap+1:LDX #3:JSR Digit
1430 CLC:LDA #6:ADC BufPtr
1440 STA BufPtr:LDA #0:ADC BufPtr+1
1450 STA BufPtr+1:JSR Digit
1460 JSR Osnewl
1470 JSR Oprt:OPT FNequw(Message3)
1480 JSR Oprt:OPT FNequw(Buffer)
1490 JSR Oprt:OPT FNequw(Message4)
1500 JSR Oprt:OPT FNequw(Buffer+6)
1510 JSR Oprt:OPT FNequw(Message5)
1520 JSR Osnewl:.Exit RTS:.Digit
1530 LDA #1:STA Index:LDY #0
1540 LDA #130:STA (BufPtr),Y:INY
1550 .loop5 LDA Linecount,X:PHA
1560 LSR A:LSR A:LSR A:LSR A
1570 ORA #&30:STA (BufPtr),Y:INY:PLA
1580 AND #&0F:ORA #&30
1590 STA (BufPtr),Y:INY:DEX
1600 DEC Index:BEQ loop5:LDA #255
1610 STA (BufPtr),Y:LDY #1:.loop6
1620 LDA (BufPtr),Y:CMP #&30
1630 BNE ret3:LDA #&20
1640 STA (BufPtr),Y:INY:CPY #4
1650 BCC loop6:.ret3 LDA #255
1660 INY:RTS
1670 .Oprt CLC:PLA:ADC #1
1680 STA Strvector:PLA:ADC #0
1690 STA Strvector+1:CLC
1700 LDA Strvector:ADC #2
1710 STA Retvector:LDA Strvector+1
1720 ADC #0:STA Retvector+1
1730 LDY #0:LDA (Strvector),Y
1740 STA Pbuf:INY:LDA (Strvector),Y
1750 STA Pbuf+1:DEY:.Loop7
1760 LDA (Pbuf),Y
1770 CMP #255:BEQ end
1780 JSR Osasci:INY:JMP loop7
1790 .end JMP (Retvector)
1800 .Message1 OPT FNequs(CHR$131+"
File not found - ")
1810  OPT FNequb(13)
1820 .Message2 OPT FNequs(CHR$133+"
Enter file name- ")
1830  OPT FNequb(129):OPT FNequb(255)
1840 .Message3 OPT FNequs(CHR$130+"Adde
d:-")
1850 OPT FNequb(13):OPT FNequb(255)
1860 .Message4:OPT FNequs(" Bytes"):OPT
 FNequb(13):OPT FNequb(255)
1870 .Message5 OPT FNequs(" DATA Lines"
):OPT FNequb(255)
1880 .Message6 OPT FNequs(CHR$7+CHR$129
+"Not enough room for whole file"):OPT F
Nequb(255)
1890 ]Code=Code+Z%-1-P%:NEXT:ENDPROC
1900 DEFFNequs(st$)
1910 $P%=st$:P%=P%+LEN$P%:=B%
1920 DEFFNequb(byte)
1930 ?P%=byte:P%=P%+1:=B%
1940 DEFFNequw(word):?P%=word MOD256
1950 P%?1=word DIV256:P%=P%+2:=B%
1960 DEFFNequd(dword)
1970 !P%=dword:P%=P%+4:=B%
```

Get it right!

```
 100 =    0 0
 110 =    0 0
 120 =    0 0
 130 = BE8A A
 140 = C2DF A
 150 = F485 6
 160 = 934A 9
 170 = 4B23 4
 180 = 2206 A
 190 = FE16 D
 200 = 8617 D
 210 = 55B6 8
 220 = AE34 E
 230 = 89C4 9
 240 = 5D47 B
 250 = 8B40 4
 260 = F92C 6
 270 = 47AF 9
 280 = 428F A
 290 = 6CE0 B
 300 = 32F1 9
 310 = CA40 2
 320 = D410 F
 330 = AEE6 7
 340 = FA1C 2
 350 =  428 5
 360 = FBB0 6
 370 =  E84 4
 380 = 7F90 1
 390 = 7982 5
 400 = 8A2F 8
 410 = A07E 6
 420 = 9D36 1
 430 = 6CC7 3
 440 = 1E79 C
 450 = 5E56 2
 460 = EDAD 2
 470 = 760C F
 480 = 81EB E
 490 = F19E E
 500 = B87C 6
 510 = FAA4 3
 520 =  D3D 2
 530 = 4942 9
 540 = 42CD A
 550 =  B19 5
 560 = 22E0 2
 570 = D576 3
 580 =  B12 B
 590 = E4E4 B
 600 = 3BF8 7
 610 = 9679 F
 620 = 3089 0
 630 =  7D3 F
 640 = 337A D
 650 = 69AA E
 660 = 15B6 9
 670 = 70F8 D
 680 = D807 A
 690 = A351 E
 700 = 5433 C
 710 =  540 F
 720 = 1581 9
 730 = BB58 F
 740 = 7E0C 4
 750 = 7979 3
 760 = 6C6B 7
 770 = 8D23 3
 780 = 45EF A
 790 = 1979 7
 800 = 11DF 4
 810 = 389A 8
 820 =  33F 3
 830 = 229D F
 840 = 46A0 9
 850 = 3B5E C
 860 = 4578 2
 870 = D576 1
 880 = D9C8 B
 890 = 1C02 9
 900 = F20B 4
 910 = D8A1 5
 920 = F7F8 A
 930 = 61F1 E
 940 = 2602 6
 950 = 3B10 C
 960 = BB77 0
 970 = 71A8 A
 980 = 9871 2
 990 = AC6E E
1000 = A3A3 1
1010 = 3989 4
1020 = 2750 C
1030 = 9BE1 A
1040 = 1ADD C
1050 = 6A75 C
1060 = 4C25 A
1070 = E737 9
1080 = A14D 8
1090 = 98AB D
1100 = CB73 0
1110 = DCBD 2
1120 = E133 F
1130 = DC6E 4
1140 = 4EF9 8
1150 = 2A36 9
1160 = 4E2C F
1170 = EBF2 4
1180 = 1885 F
1190 = 8F99 0
1200 = 8544 6
1210 = DF27 4
1220 = 1858 A
1230 = 8D3C 8
1240 = 3CD5 6
1250 = 6213 4
1260 = 19B3 E
1270 = 6418 D
1280 =   98 5
1290 = AEEA 3
1300 = 3243 7
1310 = 8BF9 9
1320 = B03A D
1330 = 556B 2
1340 = C585 0
1350 = 72AC 6
1360 = 7DE8 0
1370 = D891 E
1380 = B603 6
1390 = 85BA 3
1400 = 1653 E
1410 = 6F54 E
1420 = C29F F
1430 = 197E 1
1440 = 442D C
1450 =  F33 A
1460 =  63C A
1470 = DD15 8
1480 = 7EB4 4
1490 = 4482 D
1500 = B811 F
1510 = 77B3 0
1520 =  CEA 8
1530 = 1A20 1
1540 = A42F 3
1550 = 90BE 9
1560 = F137 F
1570 = 8D4B E
1580 = 8697 4
1590 = 28C6 6
1600 = A1EF E
1610 = FD4C C
1620 = B5DE 2
1630 = 2CD7 1
1640 = A9C9 5
1650 =   91 C
1660 = 7DDC 9
1670 = BFE8 D
1680 = E950 D
1690 = 40C5 8
1700 =  8F3 4
1710 = 342C 1
1720 = 7579 C
1730 = 7C3E F
1740 = 5C9F A
1750 = 5E73 D
1760 = EFEA 2
1770 = FBA6 7
1780 = 31E0 F
1790 = 51EC 2
1800 = 43AB A
1810 = 8BC0 6
1820 = 9D75 B
1830 = 1DEF F
1840 = F953 E
1850 = 6F7B 1
1860 = 34F6 D
1870 = 1354 6
1880 = 921C B
1890 = 2870 0
1900 = 65D3 9
1910 = D36C 6
1920 = 54B0 3
1930 = 6E8A B
1940 = D6B5 6
1950 = D8BB 6
1960 = 6563 3
1970 = E316 6
```

MICRO USER CLASSIFIEDS

Has upgrading your BBC Micro given you hardware you no longer need? Or have changing interests left you with unwanted software? Then THIS is the place to advertise your surplus items. Our 179,000 readers are always on the lookout for a bargain and this is the first place they'll look!

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Your advert will be automatically displayed on MicroLink, the electronic mail service operated in association with Telecom Gold. This means it will be seen by thousands of computer enthusiasts who can send an instant response.

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● Tape To Disc Problems Solved. Tel: 02572 65912 After 4.00pm.

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● BBC B, Oak Case, Dual 5¼" Drives, Solidisk 256K, Z80 Second Processor, Dual DFS/ADFS, Software, All Inclusive £650 ono. Cannot split. Phone 021-358 7572 between 7.30pm-10.30pm.

● Acorn Z80 Second Processor, All Manuals And Software, As New, £220. Tel: Ascot (0990) 27951.

● Aries 1EEE-488, Manual £175 o.n.o., CMS 6502 Board £60 o.n.o., Cheetah Speech £15, Solidisk Old 32K SWR £15. Tel: 0424 446982.

● BBC B OS 1.2 Acorn DFS With Sanyo 80 Track Double Sided Disk Drive £250. Tel: Droitwich (0905) 775183.

● For Sale Pace Nightingale Modem, Autodial, Auto Answer, Includes Commstar and Manuals £120 o.n.o. Tel: 0495 270695 Ask For Martyn.

● Mannesman Tally MT80+ Printer, Parallel Good Condition With Spare Ribbon £120. Tel: 0256 881985.

● Original Repton 3, Strykers Run And Ravenskull £10. Tel: Hull (0482) 801018.

● Master 512, Acorn Teletext Adaptor, Twin D/S 40/80T Disc Drives, P.S.U., Acorn Data Recorder, Ultracalc 2, Viglen Cartridge System, Manuals, Software etc. £850. Tel: 061 434 6251.

● Acorn Z80 Second Processor Complete With All Software + Manuals £190. Tel: 0903 68840.

● Printer / Plotter CGP-115 Four Colour Centronics RS232 £50., Tel: Portsmouth (0705) 693398.

● BBC B Watford DFS, 40/80 Drive, Epson Printer, Murom, Lightpen, Joystick, Many Books, Mags, Programmes on Disk Tape Cost £1000+ Accept £400 ono. Tel (0252) 623178 Evenings.

● Grundig P40-245 TV / Monitor, 40 CM FST Screen, Full Remote Control, Scart Input For RGB Etc, 1 Year Old 5 Year Guarantee, Moving To The USA, £240. Tel: Bicester 242591.

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Address ______________________________

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BBC MASTER 128K Micro	**£395**
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FREE . . . £80 worth of Software

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and ***Acorn's*** *popular* ***MUSIC 500*** *Unit with every BBC Master 128K Micro bought from us.*

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Turbo 65C102 Add-on Module	£99
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ALL ECONET UPGRADES Available	
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All Master Compact Microcomputers are supplied complete with an integral 3½" Disc Drive and various educational and professional bundled softwares.

System 1	**Standard Package**	£385
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The 80186 Co-Processor Package

This package consists of the Master 512 board, Watford Co-Pro Adaptor, Acorn 1770 Disc Upgrade and Acorn ADFS. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

Only **£275.00**

CO-PRO Adaptor

CO PRO ADAPTOR

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£50.00 (carr £5)

VARIOUS PRINTERS

● FX80/85 Tractor Feed	£35
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● EPSON EX800 Printer	£405
● Colour option for EX800/1000	£55
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Connect 3 BBC Micros to 1 Printer	£60
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Connects 3 Printers to 1 Micro	£65

(Cables extra)

65C102 2nd PROCESSOR Package

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

Only £139.00

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £2.90
27128-250nS £3.25

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

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2 × 6264LP (16K) £5.30

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(IBM/Epson compatibles)

Kaga KP815 Printer	**£269** (carr £7)
Kaga KP915 Printer	**£369** (carr £7)
RS232 Interface	£49
RS232 Interface with 2K Buffer	£69
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RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£27	RS232 + 2K Buffer	£55
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PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£6
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Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
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Type	Ribbons	Dust Covers
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RX80	£4.50	£4.50
LX80	£4.00	£4.50
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
Panasonic KX1080	£7.75	£4.75
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Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

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(On continuous fanfold backing sheet)

1,000	90 × 36mm (Single Row)	£5.00
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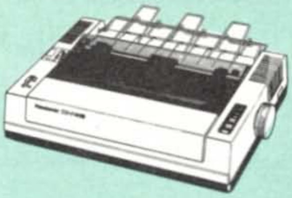
1,000	102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

Panasonic KX-P1081

(Now IBM Compatible)



Available NOW at a superbly realistic price, the KX-P1081 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy **120 cps** of clear Draft text backs up the crisp 24 cps Near Letter Quality text mode, with upto 40 superbly useful downloadable characters. A delightful range of assorted character widths is efficiently supported, with sizes ranging from a broad 5 cpi to petite 17 cpi, EVEN in NLQ mode. Some of the extensive support for serious use includes specialised functions to perform justification, centering and even left and right ranging. Proportional spacing permit even greater freedom when it comes to advanced use. Not only is the full Epson RX compatible control code set implemented, but extra codes have also been added to cater for the NLQ options, etc.

A full 96 ASCII character set is supported, with an extended set of 32 international characters and IBM special characters as well as IBM block graphics characters. A 1K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking print head takes the quickest route to print as required.

(Price inludes, FREE A 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£155** (carr. £7)

Optional RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional. logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A pronter of similar spec could cost a lot more than our ridiculously low price of:

Only **£245** (carr. £7)

Single Sheet Feeder	**£195**
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Acorn-Olivetti JP101 Ink Jet Printer

One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only **£59**

JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps.

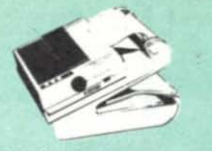
Pack of 4 refills **£10**

Screen Dump ROM for JP101 £10

256K PRINTER BUFFER Only: £149

(For full details on this extremely versatile, low cost – high performance Mega Printer Buffer please refer to page 3 of our advert.)

Printer Stand Type-YU-S25



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£29

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

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● 12" Anti-Glare Screens	**£9.50**

STAR BUY

- PHILIPS 14" Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono connectors. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £209

ZENITH

"Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Systems.)

Green (New Design) Hi-res	**£69**
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LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for KAGA	**£3**

N.B. carriage on Monitors **£7** (securicor)

SWIVEL BASES

for Video Monitors

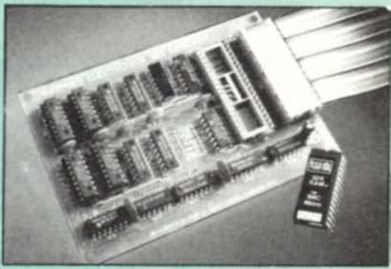
By placing your monitor on one of our superb swivel bases, you gain the freedom to adjust the monitor viewing angle to suit your needs. By doing this, you alleviate eye strain and reduce back stress.

for 12" Monitors **£10** (carr. £2.50)
for 14" Monitors **£14** (carr. £2.50)

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

● Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Ensure COMPATIBILITY with a vast range of hardware (including our ROM board, the ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, Music 500's AMPLE). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable and has the power consumption of a couple of ROMs!

● Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages, and a comprehensive manual is supplied free.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

See next page for SPECIAL OFFER

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

Continued ⟶

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K Shadow RAM Card – Printer Buffer and the much sought after, Computer Concepts' Inter-WORD, (a very powerful package) All this at an astounding price of:

Only £89 (carr £3)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED (BOOK)

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, Canon PW1080A or any Epson FX80 compatible Printer with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

Superb Value at **£5.95** (No VAT)

NOW WITH EXTRA FEATURES AT NO EXTRA COST

Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities ten simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for four years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).***

PRICES

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£62**
- *Acorn's 0.90 DFS Kit complete* **£57**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs).
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£29**

NEW MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £149 (carr £2)

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

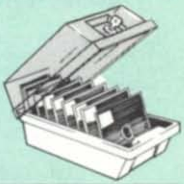
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£8

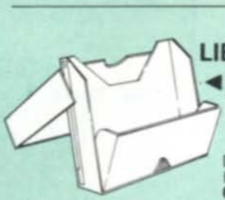
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection –
Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

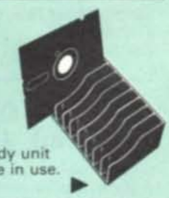


● M35 - holds upto 50 5¼" discs	£8
● M85 – holds upto 95 discs	£9
● M50 – holds 50 3½" Discs	£10

PLASTIC LIBRARY CASES



◀ Holds up to 10 5¼" Discs. **Only £2.00**



DX-08: This extremely handy unit holds upto 8 5¼" Disc while in use. **Only £2.00** ▶

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400

- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our drives are of Japanese manufacture. All our 80 track drives are already fitted with a 40-80 select switch.

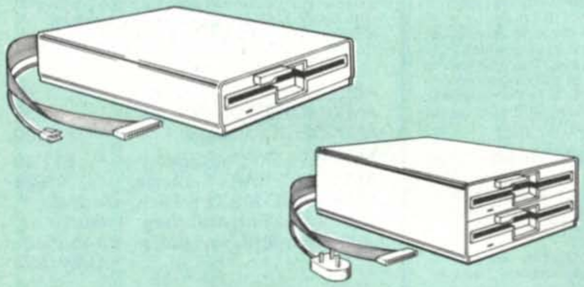
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below for single drives is for a single drive in a standard single case. Single drive in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 10th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £95		CS 200 £108	
400K (720K)	CLS400S £96	CLD 400 £180	CS 400S £109	CD400 £200
800K (1.44M)		CLD 800S £183		CD 800S £204

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**

Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40-80 track).

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	***£10***
● *10 × 5¼" D/S D/D 40 Track Diskettes*	***£12***
● *10 × 5¼" S/S D/D 80 Track Diskettes*	***£15***
● *10 × 5¼" D/S D/D 80 Track Diskettes*	***£15***
● *10" × 5¼" 1.6M D/S D/D High Density Discs for IBM XT*	***£30***
● *10 × 3½" S/S D/D 40/80 track Discs*	***£18***
● *10, × 3½" D/D D/D 40/80 track Discs*	***£22***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 × **M3** 3½" D/S D/D 80 Track Discs*	***£20***
● *10 × **M4** 5¼" S/S D/D 40 Track Discs*	***£9***
● *10 × **M5** 5¼" D/S D/D 40 Track Discs*	***£11***
● *10 × **M7** 5¼" D/S D/D 80 Track Discs*	***£14***
● *3" Double Sided Discs*	***£3 each***

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£46	£49	£72
● With Sleeves	£49	£52	£75

ACORN WINCHESTER DRIVES

Suitable for direct connection, via the 1MHz bus, to any BBC running ADFS. These Acorn Winchester disc drives are fast and extremely reliable. Each Winchester comes complete with the Level III Econet File Server software.

10 Megabytes **£1050; 30 Megabytes £1549**

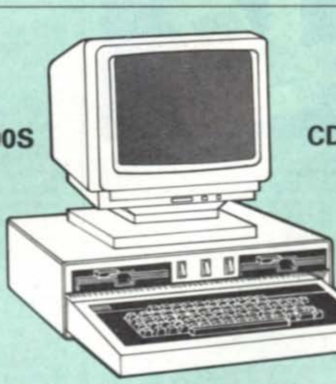
WATFORD's WINCHESTER DRIVES

● 20 Megabytes with ADFS	**£635**
● 40 Megabytes with ADFS	**£999**

WINCHESTER WORKSTATION

20 Megabyte Winchester, plus a Tape Streamer and a 400K Floppy Drive all housed in a plinth with cooling fan **£1499**

CDP 800S

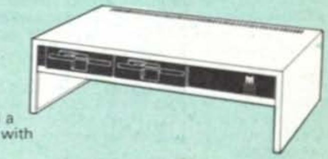


CDPM 800S

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £210 **CDPM 800S for Master £225**
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives



Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP £250 **Our Price: Only £199** (carr £7)

EPSON NLQ ROM
for the BBC Micro

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM	£7

THE NLQ DESIGNER

(The First & still the Best)

SPECIAL OFFER this Month:
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.

Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

● *NLQ Designer ROM & FONT Disc*	*£25*

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

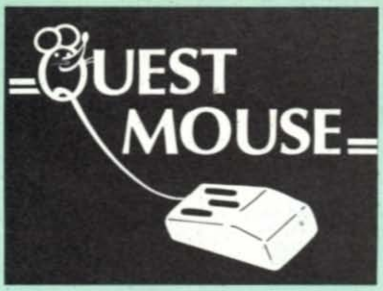
The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse. This package must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist looking for the most powerful drawing program around.
The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc. will work with it. The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford Quest Paint software and also worn out mice can be replaced for minimum cost.

The Mouse features high resolution 50 PPI operation. It has a rubber ball for maximum grip on any surface and accuracy, thus eliminating the need for extra expense of a mat for the mouse, and has three buttons to allow a massive range of options to be accessed without touching the keyboard.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.
The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard. The software is carefully designed to provide all the features needed by the budding artist. It is the nearest we can get to using paintbrush, airbrush, pencil and rubber on your computer screen.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. For a full leaflet describing the software in full detail please write to us.
Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, dither pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or centre spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size change. Trace round areas of colour. Zoom for fine editing. Compatible with screens from Watford Beeb video digitiser. Load and Save screens with colour palette information, save brush and pattern definition etc.

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE ONLY	***£35***
MOUSE MATS	***£5***
QUEST PAINT SOFTWARE	***£34***

(Quest Paint is supplied complete with Software in a 32K ROM, User Guide and Utility Disc)
(PS. The Watford Quest Mouse is FULLY Compatible with the AMX Mouse, therefore all AMX Software will work perfectly with it)

All prices in this advert are exclusive of VAT.

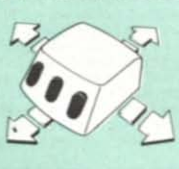
NEW

MARK II LIGHT PEN + PENPAL 2

The Watford Electronics Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.
Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (please specify). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £15

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £63 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX MAT	**£5**
AMX MOUSE ONLY	**£35**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**
AMX PAGE-MAKER Pack – A desk-top publishing software. It Works with keyboard, joystick and a mouse	**Only: £32**

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS Over 20 fonts for use with AMX PAGE-MAKER	£9.50
EXTRA EXTRA	£19
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX XAM Educational	**£19**
AMX MAX(A gem of desktop (ROM)	**£17**

RB2 MARCONI TRACKER BALL

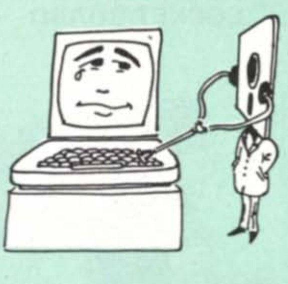
This popular unit is supplied complete with software.
Price: **£59**

FLEET STREET EDITOR

Software pack **£35**

Admin Xtra Disc Utility	**£14.95**
Walt Disney Disc Utility	**£14.95**
Fonts N Graphics Disc Utility	**£14.95**

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BBC SOFTWARE'S
Popular Educational Software

Maths with a Story 1 (Cassette). 4 primary level maths programs	£10.95
Maths with a Story 2 (Cassette) 4 further maths programs	£10.95
Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs	£19.95
WAVES: Science Topics (Disc) CSC O Level Physics program.	£14.95
RELATIONSHIP: Science (Disc) O Level Biology program.	£14.95
BONDING: Science (Disc) O Level Chemistry program.	£14.95
ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program.	£14.95
ELECTRONICS IN ACTION (Disc) O Level program	£14.95
NEWTON & THE SPACE SHUTTLE (Disc) O Level program.	£20
ECOLOGY (Disc) O Level program.	£20
POLYMERS (Disc) O Level program.	£20
Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20
FOOD & POPULATION (Disc) O Level program.	£20
MICROTECHNOLOGY (Cassette) O Level program.	£6.95
A VOUS LA FRANCE (2 Cassettes) A French language home study aid.	£17
DEUTSCH DIREKT! (Disc & Audio Cassette)	£20
Modem Master (Disc)	£11.25

TED

The Teletext Editor Package for serious users

TED is the brand new package from Watford Electronics for the editing and creation of teletext (Mode 7) screens and displays. TED is ideal for anyone wanting to create their own Mode 7 pictures (such as game title pages), designing animated displays for shop windows, exhibitions, classrooms, etc. TED is also probably the most powerful Prestel screen editor you will ever come across.

Supplied on a special 32k package, full facilities are providing for manipulating the screen, including easy to use pixel manipulation; line, column and block buffering and copying; left and right margins; large text in a variety of different fonts (contained within the ROM device); various borders and effects templates (contained within the ROM device); line and column insertion and deletion; easy to use graphics line drawing. Those are some of the features of editor itself. In addition to this, TED contains routines for taking a number of Teletext screens and creating them into an animated sequence, with user selectable display times, repeats on a group of shows, various entry methods (how the picture is put onto the screen), routing selection (both predefined and keyboard specific), chaining of other shows, etc. Scrolls treat the Teletext sequence as a very long page with a window onto it. Supplied complete with a comprehensive manual. There are many more facilities not mentioned here, so write in for a comprehensive leaflet; you'll wonder how you managed without TED.

Price: £35

ROM-SPELL

"way ahead of any competition"

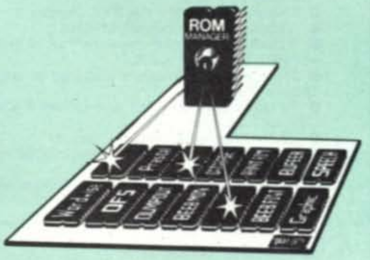
ROMSPELL
ENGLISH DICTIONARY

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

NEW

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

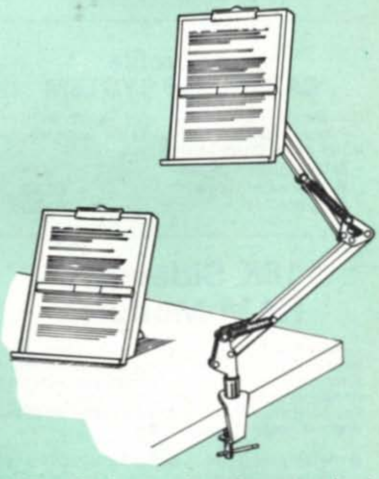
Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24.**

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

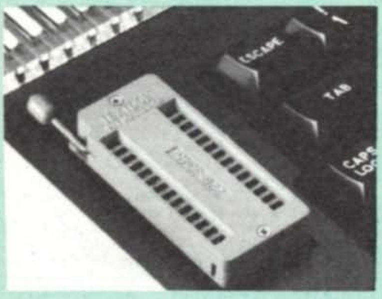
Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

All prices in this advert are exclusive of VAT.

Continued →

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices in this advert are exclusive of VAT.

16K DISC RAM

Unlike other RAM boards, this revolutionary, battery backed up, write protectable 16K sideways RAM board allows you to run from disc every sideways ROM available.

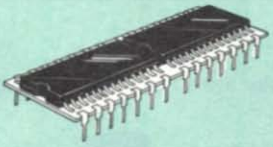
Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £32 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. ***Compatible with BBC B Plus.*** Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Do you find the 16K Sideways RAM Units confusing? If so, we have compiled this quick questionnaire to help YOU decide which is the best one for you. If the answer to any of the questions is yes, then use the index number to select from the boards below. Options in brackets indicate possible secondary choices.

Do you require:

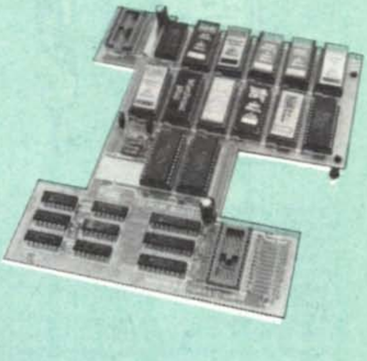
- Sideways RAM for a BBC B+ Choose 1, 2 or 3.
- Sideways RAM for the B+? Choose 3.
- A small, basic module? Choose 3.
- A sideways RAM module for a ROM board? Choose 1 or 3.
- More than one module installed at once? Choose 1 or 3.
- To use sideways RAM as a printer buffer? Choose 1 or 3.
- Battery Backup? Choose (1) or 2.
- Write protect for RAM (makes ROM look like RAM)? Choose (1) or 2.
- Read protect (allows recovery from crashes)? Choose 1.

Key:
1) 16k Sideways RAM Module
2) 16k Disc RAM
3) Solid State 16k Sideways RAM
4) Options in brackets indicate optional extras.

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

NEW

The BBC B+ Micro ROM EXPANSION BOARD

Specially designed for all BBC Plus users, this board sits in an external box, and will accept either 10 off 16k EPROMs, OR 10 off 32k EPROMs.

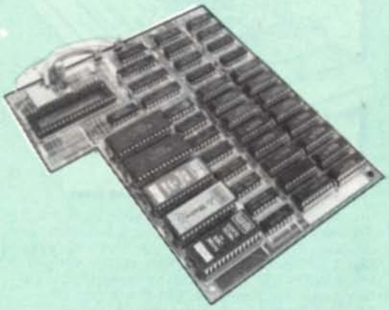
With the 32k EPROMs, only 5 can be 'online' at once (that's all the B+ can address, as each chip 'holds' two normal sockets worth), but you can swap between the two banks if necessary. With the 16k EPROMs, you can obviously address them all at once. An extra card can be added to permit 2 banks of 10 EPROMs to be used (again with only one bank available at once).

The ROM box, which has its own mains power supply, and connects to the BBC Plus via a specially designed card (which is a buffered card for your peace of mind) permits easy access to the EPROMs via the hinged lid. NO soldering is required for this board.

£79 (carr £2)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£39***
● ROM/RAM card with 64k dynamic RAM	***£52***
● ROM/RAM card with a massive 128k dynamic RAM	***£80***

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	***£6***
● *16k Dynamic RAM for Upgrade*	***£7.50***
● *Battery backup*	***£3***
● *Read and Write protect switches*	***£2** each*
Complete ROM-RAM board (all options installed)	***£89***

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple "*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***
- *BT Approval applied for.*

(When ordering, please specify the version required, (BBC or Master)

SPECIAL OFFER

Price: **£74**
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£85

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software	**Only £75**
COMMSTAR ROM package only (P&P on modem £3.00)	**£29**
Auto Dial Utilities Disc	**£9.50**

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£75** **(Carr £3)**
(Write in for full specification)

BT TELEPHONE CONNECTORS for Modems

LJU 1/4A Mini Line Master	**£4.50**
LJU 1/6A Mini Line Slave	**£3.00**
LJU 2/4A Line Master	**£4.00**
LJU 2/6A Line Slave	**£2.50**
LJU 3/4A Flush Master	**£3.95**
LJU 3/6A Flush Slave	**£2.75**
LJU 10/3A Dual Splitter	**£5.50**
4 Way BT Plug	**£0.75**

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued ⟶

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise

£24

Wordwise plus

WORDWISE PLUS
£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER-CHART ONLY: £26

Inter-WORD

Only: **£39**

INTERBASE £59

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£37
VIEW 3.0 ROM	**£54**
VIEW PROFESSIONAL	**£85**
HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£22**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2 for the Master	**£85**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£10
Juki & Brother HR15 (Disc)	£10
Silver Reed Printers (Disc)	£10

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29

MINI OFFICE II (disc) £14.50

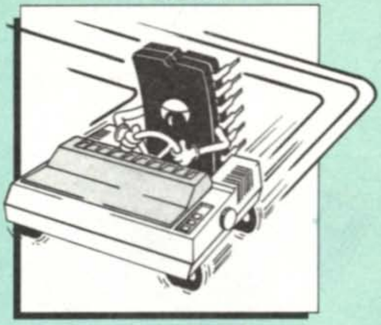
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering. Only **£20**

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8
P.S. This includes the Acorn 6502 & Z80.

A give away at . . . **Only £29**

Please specify 40 or 80 track disc when ordering.

ARIES CORNER

Aries B-32 Shadow RAM Card

18 months of intensive research and development have produced a worthy successor to the widely acclaimed Aries-B20: the revolutionary Aries-B32. This 'second generation' expansion board features 32k of RAM and a 16k ROM socket.

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: B-32 **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries B-20 and the Aries B-32. For the business user or educationalist, the compact and secure internal fitting is ideal, with the ROM board tucked neatly inside the lid where it will not cause overheating problems. The serious software developer and the hobbyist may prefer to mount the board externally, giving instant access to the sockets for experimental purposes. A zero-insertion force (ZIF) socket may be fitted to the board to enhance this mode of operation.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable 'mother board' which carries the extension ROM sockets and a small 'base board' on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have an B32 or B20, a small adaptor module (the Aries B-12C) is available at a nominal cost. The 6264 static RAM chips used to provide the sideways RAM are advertised elsewhere in our advert.

Price:
Aries B-12 **£40.** Aries B-12C **£5**

THE ARIES RANGE HARDWARE REQUIREMENTS

Aries B-32 & BBC B, MOS 1.20, hardware plugs into CPU socket.

Aries B-12 & BBC B, MOS 1.20, hardware plugs into all four sideways ROM sockets and connects to the B32 or the B20. The adaptor Aries B-12C module is necessary where these are not fitted.

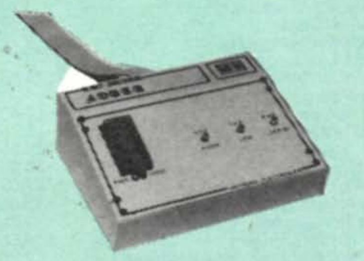
Aries B-488 BBC B, MOS 1.20, Hardware plugs into 1MHz Bus.

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

Aries B-488 Unit: **£238** (Carr £3)

ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.

The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.

The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- ● Two ultra fast programming algorithms or standard slow algorithm.
- ● Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- ● The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- ● Automatic processing to handle a list of files to program into the EPROM.
- ● Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- ● Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- ● Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- ● Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£3 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

● **ERASER EB** – Standard version erases up to 16 chips.	**£28** (carr £2)
● **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened.	**£30** (carr £2)
● Spare UV tubes.	**£9**

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234-33383

EPROM PROGRAMMER

The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette-disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

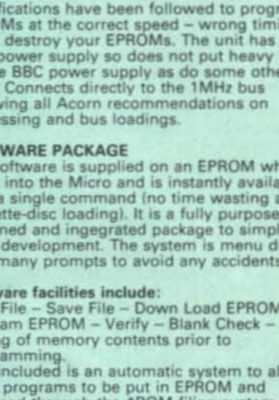
Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69 (£3 carr.)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£25** (carr £2.00)

Continued →

BOOKS (No VAT on Books)

15 Hrs Word Processor Using BBC	£3.95
30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development System	£7.50
6502 Machine Code for Humans	£7.95
6502 Reference Guide	£9.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
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Cambridge Computer Store, 4 Emmanuel St., Cambridge CB1 1NE. Tel: 0223 358264.

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts.

C.J.E. Micros, 78 Brighton Road, Worthing, West Sussex. Tel: 0903 213361.

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Mancomp Ltd, Printworks Lane, Levenshulme, Manchester. Tel: 061-224 1888-9888.

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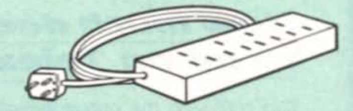

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Or you could do what more and more micro users are doing – use your BBC Micro to double as a Telex machine. And just use your ordinary telephone!

How do I turn my BBC Micro into a Telex machine?

All you need is a modem and appropriate communications software (see the advertisements in this issue), a telephone, and a subscription to *MicroLink*.

Telex is just one of a growing number of services available to micro users on *MicroLink*. With it you can also read the news as it happens, go teleshopping, create your own closed user group, send telemessages and electronic mail right round the world, download free telesoftware programs directly into your micro . . . and much more.

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MicroLink application form: Page 40

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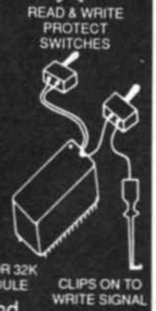

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Short, sharp and to the point

Keith Hazelton explains how to submit articles to Ceefax

THE BBC Ceefax computer magazine Next celebrated its first birthday in May. With the demise of the Oracle computer pages it is the only national teletext-based computer magazine currently on air.

Its original home was page 266 on BBC2 and consisted of a carousel of 20 sub-pages mixing general news with a selection of software reviews. Early editions also carried requests for readers to submit trial reviews, with the aim of joining a panel covering all the popular home micros.

I was one of the many hopefuls who decided to try their hand and was delighted to receive a letter welcoming me to the club. The choice of software for the initial review was up to the individual so I chose one that I was both familiar with and, more importantly, rated very highly.

The reason was simple. In my experience it is much easier to write constructively about what you like than to find something original to say when being critical. I was accepted as one of the team.

It wasn't long before one single Ceefax page was insufficient to cater for both news and reviews. BBC2 Ceefax has always been more of a background magazine, with the hard up-to-the-minute news being reserved for BBC1.

The whole of the BBC2 output was reorganised with everything appertaining to computer – Next, reviews, telesoftware, and so on – appearing in the 700 series of pages.

It was then that I decided to put forward to Next's editor, Martin Cooper, an idea that had been germinating for some time.

The whole world of the computer media has always reflected the volatility of the main market itself. Titles come and go, magazines change their style to try and match their more successful rivals and there is a branch of the computer press that for obvious reasons is treated by the nationals with an almost scant regard.

All over the country there are dedicated individuals who produce their own small computer magazines collectively know as fanzines. I suggested to Martin that these publications deserved a wider recognition and it was on this basis that my monthly column – Paper Round – was born.

Every month I am allocated five sub-pages of Next and I try to strike a balance in the coverage of the national press and the fanzine industry.

Although the working size of a Ceefax page is restricted to an absolute maximum of 19 lines of text with 35 characters to a line, the actual dimensions are somewhat larger. The extra space is taken up by headers, background colours, control codes and the like.

Writing in the Ceefax format is an art all of itself bearing in mind the limitations of space. For a start, although you theoretically have 19 lines of text to use, the bottom line should remain blank to allow for cross-referencing.

Space is further reduced when other small, but nevertheless important, points are considered. Paragraphs should only be four or five lines long; there should be a blank line between each paragraph; never break a word between two lines and always leave a space between each punctuation mark.

The most important, and in some respects the most difficult trick to master is that each Ceefax page must stand up on its own and make sense without referring to previous pages.

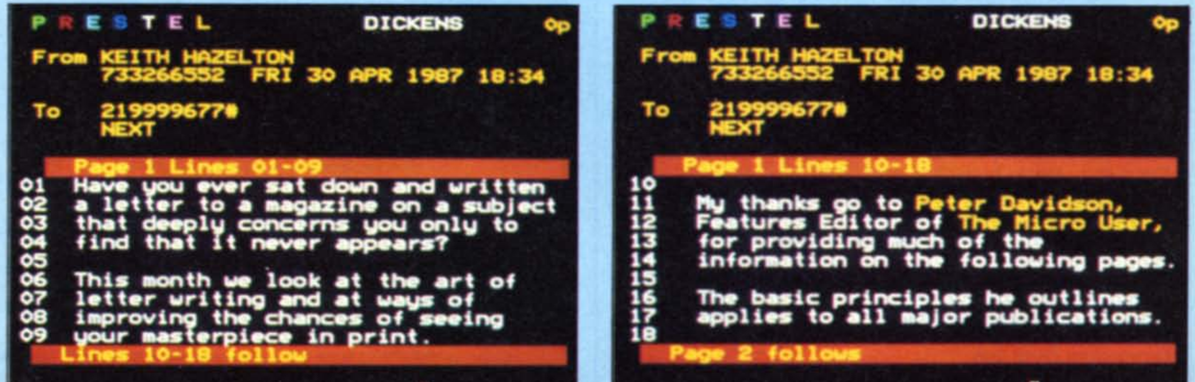
Ceefax is not an interactive medium. When you tune in and turn to a particular page, you have no control over which of the many sub-pages you strike first.

It is therefore vital that the last page of an article makes as much sense as the first. What this basically means is that the first paragraph of each sub-page has to act as an introduction to what the article is all about.

Ceefax is essentially lightweight by nature and therefore cannot go into a subject in the same depth as a conventional printed magazine, but it does have certain advantages.

If a mistake should slip through the net and appear on the screen, it takes

Turn to Page 116 ▶



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PRESTEL                        DICKENS        0p

From KEITH HAZELTON
     733266552  FRI 30 APR 1987 18:34

To   219999677■
     NEXT

     Page 1 Lines 01-09
01   Have you ever sat down and written
02   a letter to a magazine on a subject
03   that deeply concerns you only to
04   find that it never appears?
05
06   This month we look at the art of
07   letter writing and at ways of
08   improving the chances of seeing
09   your masterpiece in print.
   Lines 10-18 follow

                                 ●

KEY 1 TO STORE MESSAGE, KEY 2 TO ERASE
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To   219999677■
     NEXT

     Page 1 Lines 10-18
10
11   My thanks go to Peter Davidson,
12   Features Editor of The Micro User,
13   for providing much of the
14   information on the following pages.
15
16   The basic principles he outlines
17   applies to all major publications.
18
   Page 2 follows

                                 ●

KEY 1 TO STORE MESSAGE, KEY 2 TO ERASE
```

The two Prestel frames making a Ceefax page

◀ *From Page 115*

only seconds to rectify the error and re-publish the page. I suspect many magazine editors wish they had the same facility when a glaring printing error hits them between the eyes.

Because of the limited space at your disposal you cannot afford to waste words. Flowery, highly-descriptive prose is out. You don't have to be terse, but start using loads of adjectives and you soon reach the bottom ot the page without actually saying anything.

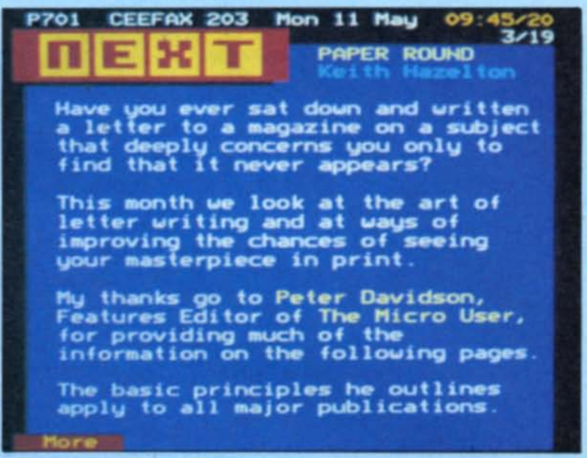
Martin Cooper had originally intended that his contributors should submit their copy on paper laid out in the Ceefax format. Being a Prestel user it occurred to me that, as Prestel shares the same teletext format as Ceefax, contributions could be sent in in the form of mailboxes, thus saving both time and postage costs.

Martin realised the benefit of this system and now many of his writers employ this method utilising my blank mailbox page.

I write and produce all my material at home. It takes two Prestel mailboxes to send each Ceefax page because there is no blank message page that can accommodate the 19 lines of text used by Ceefax.

After Martin has wielded his electronic blue pencil, the mailboxes can be booted straight on to a BBC Micro to have extra colour and graphics added. This task is simplified by the use of a special piece of software called Microfax which allows a BBC Micro to act as a direct-input terminal to the main Ceefax computer.

Contributions on any computer-related topic are always welcomed on Next. They can be submitted electronically on Prestel (MBX 219999677), Telecom Gold (72:MAG10496) or on paper addressed to : NEXT, Room 7059, BBC TV Centre, London W12 7RJ. ■



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NEXT
PAPER ROUND
Keith Hazelton

Have you ever sat down and written
a letter to a magazine on a subject
that deeply concerns you only to
find that it never appears?

This month we look at the art of
letter writing and at ways of
improving the chances of seeing
your masterpiece in print.

My thanks go to Peter Davidson,
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information on the following pages.

The basic principles he outlines
apply to all major publications.

More

The final Ceefax page

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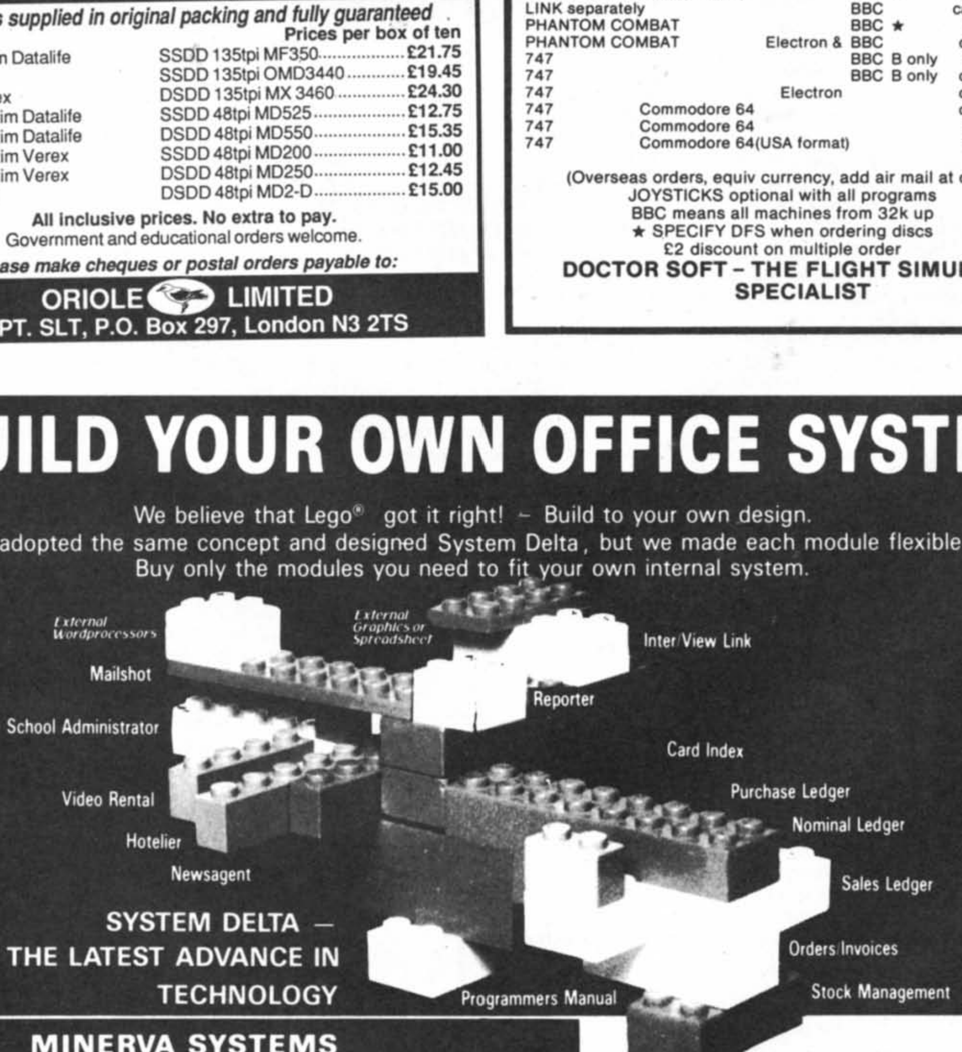

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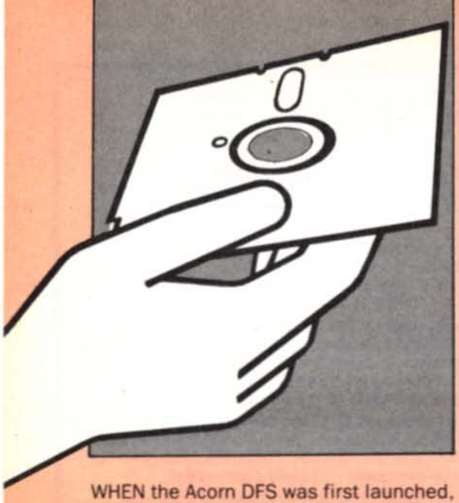

A last osword on the ADFS?

Mike Stalybrass looks at new calls introduced by Acorn

WHEN the Acorn DFS was first launched, it soon came under fire. There were hardware limitations caused by the use of the rather ancient 8271 Disc Controller, but I think a major shortcoming was the limit of 31 files per disc surface.

Another was its inability to extend the length of a file, unless there was the necessary space immediately following the space already occupied by the file on the disc.

Also, for some people the limit on file size was a problem. This was caused by restricting a file to only one side of the disc – maximum size 199.5k, even using an 80 track disc.

And using only 18 bits for address information gave a maximum theoretical file size of only 256k.

Acorn clearly recognised the need for a more sophisticated Disc Filing System, and by 1984 the Advanced Disc Filing System – ADFS – was beginning to take shape.

This differs from the old DFS in a number of ways. First, it is designed around the use of a more advanced Disc Controller chip, the WD1770, which enables it to store up to 80 per cent more information on a disc by using double density recording.

However, for compatibility with the old DFS, the disc controller chip can also be used in single density mode.

Another enhancement is the concept of keeping a map of free space on a disc. This allows the ADFS to keep track of free areas so that files can be slotted into them.

Finally, the use of tree-structured file names has been adopted. These last two concepts are to be found in other major disc operating systems, but the implementations are rather different.

For instance, Acorn uses 256 byte sectors, whereas others use 512.

Acorn ADFS discs can be single or double sided. On a double sided disc the two surfaces are considered to form just one entity and both sides are accessed using one drive identity.

Thus you have no control over which side of the disc is used – though you do get a solid 640k of disc space.

Using all the 32 bits allowed by the Acorn conventions to store addresses, the maximum theoretical file size is increased to a massive 4096Mb.

However, when using the ADFS the maximum file size is actually limited to 512Mb, as only 29 bit disc addresses are used – a 21 bit disc sector address, with a further 8 bits for position within sector.

The remaining three address bits are used to identify the disc drive rather than the address within it.

However, as no affordable disc drive has even that much capacity, it should not prove much of a limitation.

Because of all the changes, Acorn has introduced some additional osword calls for intimate interactions with the ADFS.

With the old DFS, three calls were defined, &7D, &7E and &7F. These are still used for all disc functions in single density mode.

They are also used by some non-Acorn DFSs in double density mode – those that still use the conventions of the old DFS in double density.

The four new osword calls – &70, &71, &72 and &73 – are only for use in double density mode, and then only by filing systems which conform to the Acorn ADFS conventions.

Thus there are now three possible disc formats around – single density DFS, double density DFS (non-Acorn) and double density ADFS. And all of these could be on 40 or 80 track single or double sided discs.

To understand the new osword calls you need some understanding of the

Bytes (hex)	Content
0	Catalogue Master Sequence Number.
1-4	Catalogue fixed identifying string, "Hugo".
5-E	Name of first entry, plus access bits:
	Byte 5 bit 7 set Read access allowed.
	Byte 6 bit 7 set Write access allowed.
	Byte 7 bit 7 set entry is Locked.
	Byte 8 bit 7 set entry is a Directory.
	bit 7 clear entry is a file
F-12	Load address of entry
13-16	Execution address of entry
17-1A	Length of entry
1B-1D	Start sector of entry
1E	Entry sequence number

The structure from byte 5 to &1E is repeated for 47 entries.

Bytes (hex)	Content
4CB	Zero
4CC-4D5	Catalogue name and access string.
4D6-4D8	Start sector of parent catalogue.
4D9-4EB	Catalogue title, if different from catalogue name.
4EC-4F9	Not used, but reserved.
4FA	Catalogue Master Sequence Number (again).
4FB-4FE	Catalogue fixed identifying string, "Hugo" (again).
4FF	Zero.

Figure I: ADFS catalogue structure

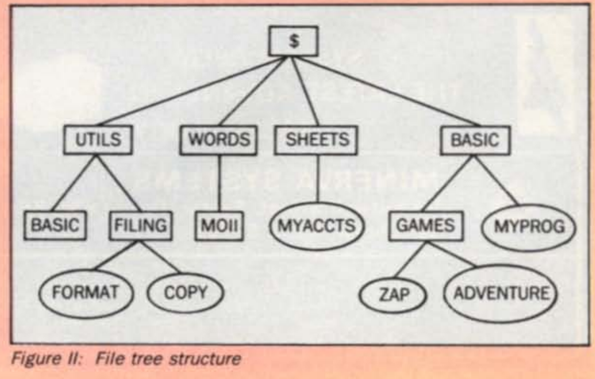

Figure II: File tree structure

Sector Zero	
Bytes	**Content**
0-2	Start sector of first free space.
Repeated for 82 entries	
F6-FB	Reserved.
FC-FE	Total number of sectors on disc.
FF	Checksum on this sector.
Sector One	
0-2	Length of first free space.
Repeated for 82 entries.	
F6-FA	Reserved.
FB-FC	Disc identifier.
FD	Boot option.
FE	Pointer to last free space entry + 1.
FF	Checksum on this sector.

Figure III: Free space map

A = &70	XY points to a two-byte block.
XY + 0	Master Sequence Number.
+ 1	Status byte.
Status Byte	**Meaning if set**
bit 0	File ensuring in progress.
bit 1	Bad free space map.
bit 2	*OPT1 setting.
bit 3	Undefined.
bit 4	Undefined.
bit 5	Winchester Disc Controller present.
bit 6	Tube in use by ADFS.
bit 7	Tube present.

Table I: Osword &70

Acorn ADFS conventions and how they differ from those of the old DFS.

When you first use the ADFS, the most noticeable difference is probably in the way that you can build up filenames.

With the old DFS, filenames were restricted to 7 characters, with a single character directory letter.

And there was just a single catalogue on the disc, occupying two sectors (sectors 0 and 1), which contained up to 31 entries.

If you wanted to store more files than that you had to use non-standard methods. No matter what directory letter you used, the entry was stored in that one catalogue.

With the new ADFS there can be any number of catalogues on the disc, each one occupying five sectors and each containing up to 47 entries. The structure of these sectors is shown in Figure I.

The entries in each catalogue can refer either to a file or to another catalogue.

There has to be a so-called root catalogue on the disc, signified by the name $, which always occupies sectors 2-6. But sub-catalogues can be located anywhere on the disc.

And catalogue names are not limited to one letter – they can be up to 10 characters long, the same as a file.

If a file is in a sub-catalogue or even a sub-sub-sub-catalogue – then the complete filename includes the path through all the higher level catalogues. Thus a complete filename might be:

```
$.Basic.Games.ZAP
```

where $, Basic and Games are all catalogue names, Basic being a catalogue in catalogue $ and Games a catalogue in Basic.

Only ZAP, right at the end of the path through the catalogues, is an actual file. Figure II shows a representation of this "tree" file structure.

In the old DFS there is a sequence number associated with the disc. Stored in the catalogue, it is incremented every time the catalogue is changed. This one byte sequence number is accessed by osword &7D.

With the new ADFS, there is a Master Sequence Number associated with every catalogue. This is accessed by osword &70, which requires a parameter block of two bytes.

But this call, unlike osword &7D, also gives some other status information in the second byte of the parameter block, as shown in Table I.

With both the DFS and the ADFS the sequence number is held as a binary coded decimal number.

In the ADFS, disc files still have to occupy a single, continuous block of space on the disc. As with the earlier DFS, no fragmentation of a disc file is allowed.

However, to simplify the task of the ADFS when space has to be found, a free space map is maintained.

This identifies where all the available blocks of free space are and allows the ADFS to pop new files, or rewritten old ones, into the most appropriate slot on the disc.

It also allows the ADFS to spot when there is a build up of small free areas that can be released by compacting the disc.

A = &71	XY points to a four-byte block which will contain free space on disc.
XY + 0	Least significant byte.
+ 1	Less significant byte.
+ 2	More significant byte.
+ 3	Most significant byte.

Table II: Osword &71

If you try to extend a file that has another file at the end of it, instead of the annoying "Can't extend" error, the ADFS will actually relocate the whole file, giving a mysterious delay.

But if it can't relocate the file you get "Disc Full" error instead. Sadly, *Compact is still a necessary evil.

The free space map of the ADFS is permanently located on sectors 0 and 1 of the disc. There is space for a total of 82 free space entries, each using three bytes to point to the starting free sector,

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A = &72	XY points to a 15-byte block.
XY + 0	zero
+ 1)	
+ 2)	Pointer to data buffer
+ 3)	in memory.
+ 4)	
+ 5)	&08 to read, &0A to write.
+ 6	
bits 5-7	= drive number
bits 0-4	= 5 most significant bits of absolute sector number.
+ 7)	Absolute sector number.
+ 8)	
+ 9	Sector count for read operations.
+10	Unused.
+11)	
+12)	Data length for write
+13)	operations.
+14)	

On exit, XY contains zero if transfer was successful, the error number if not.

Error	Meaning
72	Cyclic redundancy check error
80	Sector not found
96	Bad command
97	Bad address
99	Volume error
101	Bad drive

Table III: Osword &72

◀ *From Page 119*

and three more to give the length.

As all disc operations are done using whole 256 byte sectors, only three bytes are needed when referring about sectors, as opposed to the four needed to refer to a full 32-bit address. Details of the free space map are given in Figure III.

The second new osword call, &71, is concerned with the free space map and is the equivalent of a *FREE call. It requires a four byte parameter block, shown in Table II.

The value returned is the number of free bytes left on the disc. This is the closest equivalent to the old osword &7E, which returns the total size of the disc.

A new osword call, &72, is the most complex and is concerned with reading and writing data to and from the disc. A parameter block of 15 bytes is required.

Specifying the amount of data to be transferred can be done either as a sector count (1 to 255 sectors) or as a byte count (0 to 4096k). Details of the parameter block are given in Table III.

A = &73	XY points to a five-byte data block.
XY + 0)	
+ 1)	Absolute sector number.
+ 2)	
+ 3	Disc error number.
+ 4	Channel number of file where error occurred.

Table IV: Osword &73

Only two functions have been documented by Acorn, reading sectors and writing sectors, using function codes &08 and &0A.

But it is surely no coincidence that these correspond to the most significant four bits of the 1770 FDC commands for reading and writing a single sector.

Although the WD1770 has commands to read and write multiple sectors, they are not often used by programmers as they are difficult to implement. Instead, single sector operations are repeatedly done.

The final new osword call is &73, which requires a 5 byte parameter block, in which is returned details of the last disc error. This is shown in Table IV.

Compared with the old DFS the ADFS is certainly much more flexible and sophisticated. However, I think that it does still have weaknesses.

I liked the way that files could be grouped using a directory letter under the old DFS. The letter gave some indication of the sort of file (Ascii, Basic, data and so on) and *CAT revealed all the files.

Now with the ADFS, I can group similar files in different catalogues, but cannot then see the contents of more than one catalogue by a simple star command.

And the requirement that a file must occupy consecutive sectors on a disc and cannot be fragmented is still a serious weakness if you use random access files which grow.

Despite its faults the ADFS is a very good piece of software and a useful addition to any BBC Micro. ■

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Command performance

> *I have worked out how to use *LINE and *CODE to implement my own operating system commands but I would like to be able to use my own command words, like *WRITE. Roms can recognise commands but I don't have any sideways ram. Is there any way to change the standard commands?"* – **Lee Walker, Sutton-in-Ashfield, Notts.**

Steve Turnbull shows you how to implement star commands

THE commands *LINE and *CODE are included in the MOS rom and are fixed, so you can't change them. The easiest way to implement additional star commands is to write a disc-based utility.

This means the DFS rom can do all the hard work of command recognition and running the program. But if you want your utility to be resident in your micro all the time you will have to write not only the code for the utility, but also the code to recognise the command.

Star commands are processed and recognised by the operating systems Command Line Interpreter (CLI) which can be accessed in several ways:

From Basic as an immediate command:

```
*DELETE fred
```

From within a Basic program:

```
OSCLI("DELETE "+filename$)
```

Or even from machine code:

```
LDX #drive_command MOD 256
LDY #drive_command DIV 256
JSR oscli
```

But whichever way the call is made they all follow the same route, via the CLI vector address.

Vector addresses are pairs of bytes in ram which hold the address of an operating system routine. Because this address is held in ram it can be changed – redirected – to the address of a different routine. And this is exactly what we need to do.

The memory address of the CLI vector, *cliv*, is &208. That byte of ram and the following byte, &209, together contain the address of the CLI routine. While the actual address of the CLI routine varies between different versions of the operating system, the vector address is always the same, &208.

What we want to do is insert the address of our command recognition routine into the CLI vector – this is called intercepting the vector. But we must remember the address of the real CLI routine in case our routine doesn't recognise the command, then it can be passed on (lines 430-550 in Listing I).

The next step is to recognise a command when our routine is entered. Any leading spaces and asterisks are skipped (lines 630-700) and the next character is examined. If this character is a full stop, the command being checked is the minimum abbreviation for *CAT(*.) and is passed straight on to the original CLI routine (lines 750-760).

If the first character in the command line is | then this is a comment line (lines 720-730). Try typing this:

```
*| This is a comment
```

The computer simply ignores the line, like a Basic REM statement.

Having passed this initial stage, we get on to the actual command recognition. To conform with the standard CLI practice, our recognition routine has to ignore upper and lower case differences (line 1100). It also has to allow abbreviations of the commands, just as *HELP can be shortened to *H. (lines 1190-1200 and line 1370)

The list of commands to be recognised by our routine is contained in a table called, unsurprisingly, *cmnd_table*.

Each entry in the table is created by FNentry, which takes two parameters. The first is the command which must be given in capitals and the second is a command routine number (lines 1700-1750).

The characters of the command word are inserted into memory, followed by the command routine number made negative by EORing it with &FF, (lines 1840-1860). Because it is negative, the number can act as an end of command marker (line 1390). The end of the command table is marked by four zero bytes (line 1750).

The command routine number is used as an index into a jump table, *jump_table*. The address of each command routine is included here just once. The first address is routine number zero, the second is routine number one and so on (lines 1770-1800).

This method allows two or more commands to be used for the same routine. In my example program both the commands *BEEP and *NOISE use command routine one, *noisy*. Figure I shows how the two tables link together to find the right routine.

If a command has been recognised the *recognise* routine is exited with the carry flag clear and the accumulator contains the negative routine number (lines 1390-1420). This is negated and used to find the address of the appropriate routine, which is finally jumped to (lines 800-880).

When a command is not recognised the *recognise* routine is exited with the carry flag set – and control is passed on to the standard CLI (lines 1030-1060, line 790 and lines 900-940).

The example program implements five new commands, two of which perform the same function. The *SWOFF command resets the CLI vector address to what it originally was, effectively switching off the additional commands (lines 1440-1480). *REPORT just prints the last error message again and *ERROR generates an error.

The program as it stands is self modifying – it actually modifies itself at lines

Turn to Page 122 ▶

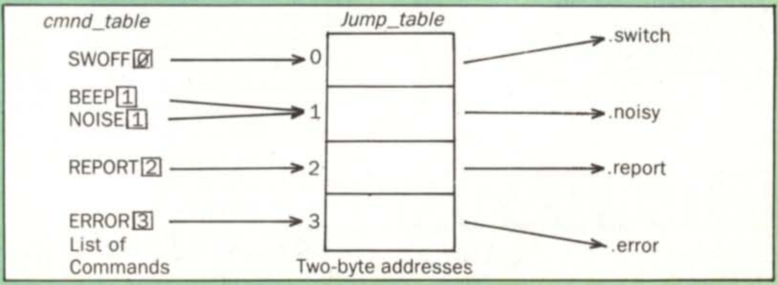

Figure I

◀ From Page 121

510, 530, 840, 860, 980, 1440 and 1460. This was done to ensure that it would not conflict with any rom (specifically Wordwise Plus). Because of this, the recognition routine could not be used in a rom. But it is a simple matter to change this, just change and add the lines in Table I.

And that is how you implement your own star commands as part of the CLI process.

```
  361 oldcliv=&88
  362 jumpvec=&8A
  363 pnt_off=&8C
  510  STA oldcliv
  530  STA oldcliv+1
  840  STA jumpvec
  860  STA jumpvec+1
  870 \remove label
  880  JMP (jumpvec)
  930 \remove label
  940  JMP (oldcliv)
  980  STY pnt_off
 1010 \remove label
 1020  LDY pnt_off
 1440  LDA oldcliv
 1460  LDA oldcliv+1
```

Table I: Changes needed to make Listing I non-self modifying.

```
100 REM ***********************
110 REM *      STAR TEST      *
120 REM *  by Steve Turnbull *
130 REM * (c) The Micro User *
140 REM ***********************
150 MODE7
160 PROCinitialise
170 PROCassemble_code
180 $&700="SA.TEST "+STR$~code+"+100"
190 X%=0:Y%=7:CALL oscli
200 CALL set_vectors
210 END
220 ---
230 DEF PROCinitialise
240 beep=7
250 return=13
260 bar=ASC"|"
270 dot=ASC"."
280 space=ASC" "
290 asterisk=ASC"*"
300 osnewl=&FFE7
310 oswrch=&FFEE
320 oscli =&FFF7
330 errpnt=&FD
340 cliv=&0208
350 code=&0900
360 pointer=&F2
370 ENDPROC
380 ---
390 DEF PROCassemble_code
400 FOR L%=0 TO 2 STEP 2
410 P%=code:[OPT L%
420 .set_vectors
430  LDX #mycliv MOD256 \Make sure
440  LDY #mycliv DIV256 \that vector
450  CPX cliv           \not already
460  BNE re_vector      \changed
470  CPY cliv+1
480  BEQ no_vector
490 .re_vector      \otherwise set up
500  LDA cliv       \new vectors
510  STA oldcliv+1
520  LDA cliv+1
530  STA oldcliv+2
540  STX cliv
550  STY cliv+1
560 .no_vector
570  RTS
580 .mycliv
590 \set address of command
600  STX pointer      \save address
610  STY pointer+1    \of command
620 \skip spaces and '*'s
630  LDY #0
640 .skip_loop
650  LDA (pointer),Y
660  INY
670  CMP #asterisk
```

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```
680  BEQ skip_loop
690  CMP #space
700  BEQ skip_loop
710 \Check whether a comment - |
720  CMP #bar
730  BEQ continue
740 \Check whether *CAT abbrv.
750  CMP #dot
760  BEQ continue
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
770 \Now is it one of my commands?
780  JSR recognise
790  BCS continue \not if carry set
800  EOR #&FF     \negate cmnd number
810  ASL A        \number times 2 and
820  TAX          \prepare to index
830  LDA jump_table,X \Get address of
840  STA jumpvec+1      \the command
850  LDA jump_table+1,X \routine, set
860  STA jumpvec+2    \up jump vector
870 .jumpvec
880  JMP &FFFF        \and go to it.
890 \Command not recognised
900 .continue
910  LDX pointer   \reset values and
920  LDY pointer+1 \process normally
930 .oldcliv
940  JMP &FFFF
950 \Command recognition routine
960 .recognise
970  DEY             \reset first char-
980  STY pnt_off+1 \acter of command
990  LDX #0          \index first cmnd
1000 .recog_loop
1010 .pnt_off
1020  LDY #&FF  \First char of line
1030  LDA cmnd_table,X \next cmnd char
1040  BNE try_command  \if zero then
1050  SEC            \it is the end of
1060  RTS            \the command table
1070 .try_command
1080  LDA (pointer),Y \Compare 2 chars
1090  INY                \of strings
1100  AND #&5F
1110  CMP cmnd_table,X
1120  PHP
1130  INX
1140  PLP                \Repeat'til they
1150  BEQ try_command \ are different
1160  DEY
1170  DEX
1180  LDA (pointer),Y \test genuine
1190  CMP #dot          \end of input
1200  BEQ abbrev        \string. Either
1210  CMP #space        \'.', space or
1220  BEQ ok_so_far   \return
1230  CMP #return
1240  BEQ ok_so_far
1250 .not_found     \otherwise not been
1260  JSR find_end \found, move to end
1270  INX            \of current command
1280  JMP recog_loop
1290 .find_end
1300  LDA cmnd_table,X \Keep testing
1310  BMI found_end \characters until
1320  INX            \the -ve command
1330  BNE find_end  \number is reached
1340 .found_end
1350  RTS
1360 .abbrev        \if abbv then move
1370  JSR find_end \to end of command
1380 .ok_so_far
1390  LDA cmnd_table,X \now test if we
1400  BPL not_found \are pointing to
1410  CLC       \-ve command number, if
1420  RTS       \it is then found it
1430 .switch
1440  LDA oldcliv+1 \Reset vector
1450  STA cliv
1460  LDA oldcliv+2
1470  STA cliv+1
1480  JMP vector_exit
1490 .noisy
1500  LDA #beep
1510  JSR oswrch
1520  JMP vector_exit
1530 .report
1540  LDY #1
1550 .r_loop
1560  LDA (errpnt),Y \print last error
1570  BEQ r_exit
1580  JSR oswrch
1590  INY
1600  BNE r_loop
1610 .r_exit
1620  JSR osnewl
1630 .vector_exit
1640  RTS
1650 .error
1660  BRK:BRK          \generate error
1670  OPT FNequs("User error")
1680  BRK
1690 .cmnd_table
1700  OPT FNentry("SWOFF",0)
1710  OPT FNentry("BEEP",1)
1720  OPT FNentry("NOISE",1)
1730  OPT FNentry("REPORT",2)
1740  OPT FNentry("ERROR",3)
1750  OPT FNequd(0)
1760 .jump_table
1770  OPT FNequw(switch)
1780  OPT FNequw(noisy)
1790  OPT FNequw(report)
1800  OPT FNequw(error)
1810 ]:NEXT
1820 ENDPROC
1830 ---
1840 DEF FNentry(e$,E%)
1850 L%=FNequs(e$)
1860 =FNequb(E%EOR&FF)
1870 ---
1880 DEF FNequs(s$)
1890 $P%=s$:P%=P%+LENs$:=L%
1900 ---
1910 DEF FNequd(D%)
1920 !P%=D%:P%=P%+4:=L%
1930 ---
1940 DEF FNequw(W%)
1950 !P%=W%:P%=P%+2:=L%
1960 ---
1970 DEF FNequb(B%)
1980 ?P%=B%:P%=P%+1:=L%
1990 ---
```

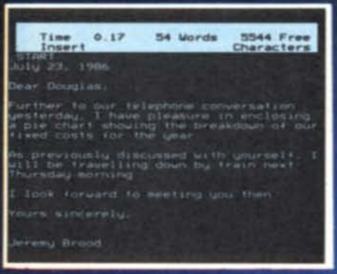
This listing is included in this month's tape & disc offer. See order form on Page 151.

Get it right!

```
100 =    0 0 | 420 = C0E9 9 | 740 =    0 A
110 =    0 0 | 430 = 3089 4 | 750 = BF5D 8
120 =    0 0 | 440 = DAF6 7 | 760 = EE21 0
130 =    0 0 | 450 = D039 0 | 770 =    0 0
140 =    0 0 | 460 = 3842 F | 780 =  4DF 3
150 = 8AFC C | 470 =  C05 0 | 790 = B20F F
160 = 30B2 E | 480 = 3DFC 0 | 800 = 618F 5
170 = 8FD2 D | 490 = E16C D | 810 = 71F9 2
180 = C00E E | 500 = FEEB 9 | 820 =  145 F
190 = C836 D | 510 = 705A 2 | 830 = 1C45 9
200 = A6D0 6 | 520 = B6CB 3 | 840 = 33B9 0
210 = FD2E 0 | 530 = 4039 2 | 850 = 451B 8
220 = 41E2 5 | 540 = DEC5 3 | 860 = 7574 9
230 = EC42 C | 550 =  47C D | 870 = 1BD1 B
240 = E631 5 | 560 = CE5E 4 | 880 = EC41 6
250 = FE6D E | 570 = 9843 1 | 890 =    0 6
260 = DC2D 8 | 580 = 7B38 F | 900 =  2EE D
270 = 8B52 3 | 590 =    0 F | 910 = A1F4 6
280 = 2839 3 | 600 = 395E 8 | 920 = 6232 B
290 = 169F 5 | 610 = FA0B F | 930 = 9B4C 8
300 = FE7F 6 | 620 =    0 F | 940 = 633B B
310 =   78 C | 630 = 9CF1 1 | 950 =    0 B
320 = CDE9 E | 640 = B4C9 4 | 960 = B8B3 7
330 = 9A08 8 | 650 = 957B F | 970 = B16C F
340 = D704 9 | 660 = 6623 5 | 980 = AEA1 7
350 = 3224 D | 670 = 3A7F F | 990 = FE20 E
360 = 1FAD E | 680 = 476B 5 |1000 = 2877 9
370 = ED0F A | 690 = E345 D |1010 = 9140 3
380 = 41E2 3 | 700 = 476B 5 |1020 = 509C 8
390 = 8CE6 0 | 710 =    0 5 |1030 = 3FDD 3
400 = AAB9 0 | 720 = 4E34 3 |1040 = F5B7 3
410 = 7CBB 0 | 730 = EE21 A |1050 = 49D0 1
```

```
1060 = 6DAB 1 | 1380 = 4268 9 | 1700 = A183 0
1070 = EF64 7 | 1390 = 3FDD 4 | 1710 = D8BA B
1080 = 8C7E C | 1400 =  ED8 5 | 1720 = AA63 B
1090 = 5F81 7 | 1410 = 3E24 F | 1730 = 2111 7
1100 = 9602 6 | 1420 = 92EC 5 | 1740 = ADD7 0
1110 = 17D5 7 | 1430 = B0EA E | 1750 = 4240 7
1120 = 805E 4 | 1440 = 4BDB D | 1760 = 2C42 C
1130 = 7602 4 | 1450 = 8CA3 2 | 1770 = 7C43 9
1140 = 18F9 A | 1460 = A08F E | 1780 = 6B35 5
1150 = 8DBD 6 | 1470 = 2712 6 | 1790 = CE35 7
1160 = F888 A | 1480 = 113B B | 1800 = 62F7 7
1170 = E8A9 9 | 1490 = 59AD 8 | 1810 = DA42 C
1180 = 8C7E 6 | 1500 = EBFE 6 | 1820 = ED0F 8
1190 = D92C 4 | 1510 = 9224 5 | 1830 = 41E2 3
1200 = 201D 5 | 1520 = 113B 9 | 1840 = 7620 7
1210 = D957 A | 1530 =  D2E 6 | 1850 = F8F9 8
1220 = 9412 E | 1540 = 8CD0 3 | 1860 = 2A83 8
1230 = AB4D 2 | 1550 = 2650 9 | 1870 = 41E2 8
1240 = B1CA 6 | 1560 = 8AF3 C | 1880 = 4E1D 2
1250 = A3DD 6 | 1570 = C34C F | 1890 = CB3B 2
1260 = E418 3 | 1580 = 9224 D | 1900 = 41E2 6
1270 = 4F86 E | 1590 = 6623 7 | 1910 = 5E97 9
1280 = B64F 6 | 1600 = 2A88 4 | 1920 = 2391 6
1290 = DB06 0 | 1610 = F9F6 6 | 1930 = 41E2 9
1300 = 3FDD 5 | 1620 = 3334 4 | 1940 = AE2C 8
1310 = 2D24 A | 1630 = 4B4C 3 | 1950 = A540 E
1320 = 1B49 3 | 1640 = 9843 F | 1960 = 41E2 0
1330 =  898 8 | 1650 = D394 C | 1970 = 21B2 8
1340 = 91C0 7 | 1660 = 9AEB D | 1980 =  8D5 C
1350 = 9843 5 | 1670 = 41FB 5 | 1990 = 41E2 4
1360 = CA6D 0 | 1680 = E2BF 3 |
1370 = E418 A | 1690 = 4D85 E |
```

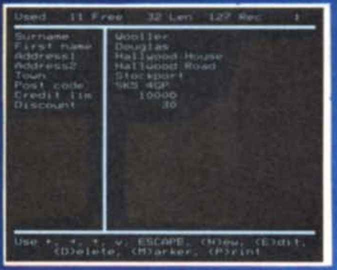
All this in just



```
  Time   0.17    54 Words   5544 Free
  Insert                   Characters
 START
July 23, 1986

Dear Douglas,

Further to our telephone conversation
yesterday, I have pleasure in enclosing
a pie chart showing the breakdown of our
fixed costs for the year

As previously discussed with yourself, I
will be travelling down by train next
Thursday morning

I look forward to meeting you then

Yours sincerely,


Jeremy Brood
```

WORD PROCESSOR

Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!



```
Used    11 Free   32 Len  127 Rec     1

Surname        Wooller
First name     Douglas
Address1       Hallwood House
Address2       Hallwood Road
Town           Stockport
Post code      SK5 4GP
Credit lim         10000
Discount              30

Use ↑, ←, →, v, ESCAPE, (N)ew, (E)dit,
      (D)elete, (M)arker, (P)rint
```

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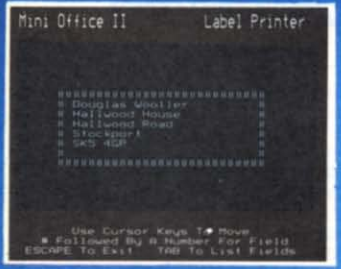

```
Mini Office II              Label Printer



      ###########################
      # Douglas Wooller         #
      # Hallwood House          #
      # Hallwood Road           #
      # Stockport               #
      # SK5 4GP                 #
      #                         #
      ###########################



        Use Cursor Keys To Move
   # Followed By A Number For Field
ESCAPE To Exit    TAB To List Fields
```

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60
50
40
30
20
10
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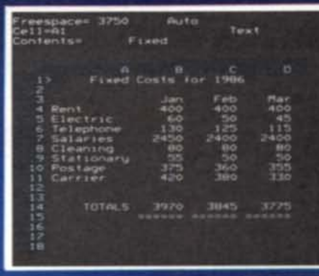

```
Freespace= 3750     Auto
Cell=A1                   Text
Contents=      Fixed

            A      B      C      D
  1>     Fixed Costs for 1986
  2
  3               Jan    Feb    Mar
  4 Rent          400    400    400
  5 Electric       60     50     45
  6 Telephone     130    125    115
  7 Salaries     2450   2400   2400
  8 Cleaning       80     80     80
  9 Stationary     55     50     50
 10 Postage       375    360    355
 11 Carrier       420    380    330
 12
 13
 14    TOTALS    3970   3845   3775
 15            ====== ====== ======
 16
 17
 18
```

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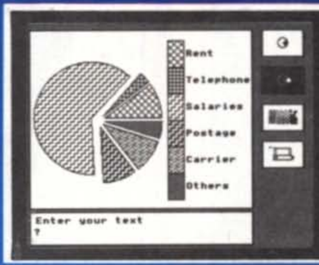

```
Enter your text
?
```

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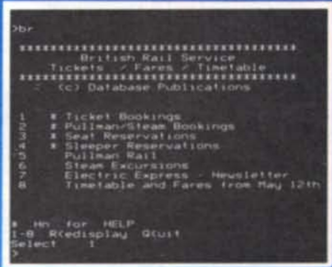

```
>br

 ****************************************
         British Rail Service
     Tickets  / Fares / Timetable
 ****************************************
       (c) Database Publications

 1    * Ticket Bookings
 2    * Pullman/Steam Bookings
 3    * Seat Reservations
 4    * Sleeper Reservations
 5      Pullman Rail
 6      Steam Excursions
 7      Electric Express - Newsletter
 8      Timetable and Fares from May 12th


*  Hn  for  HELP
1-8  R(edisplay  Q(uit
Select     1
>
```

that can't be matched!

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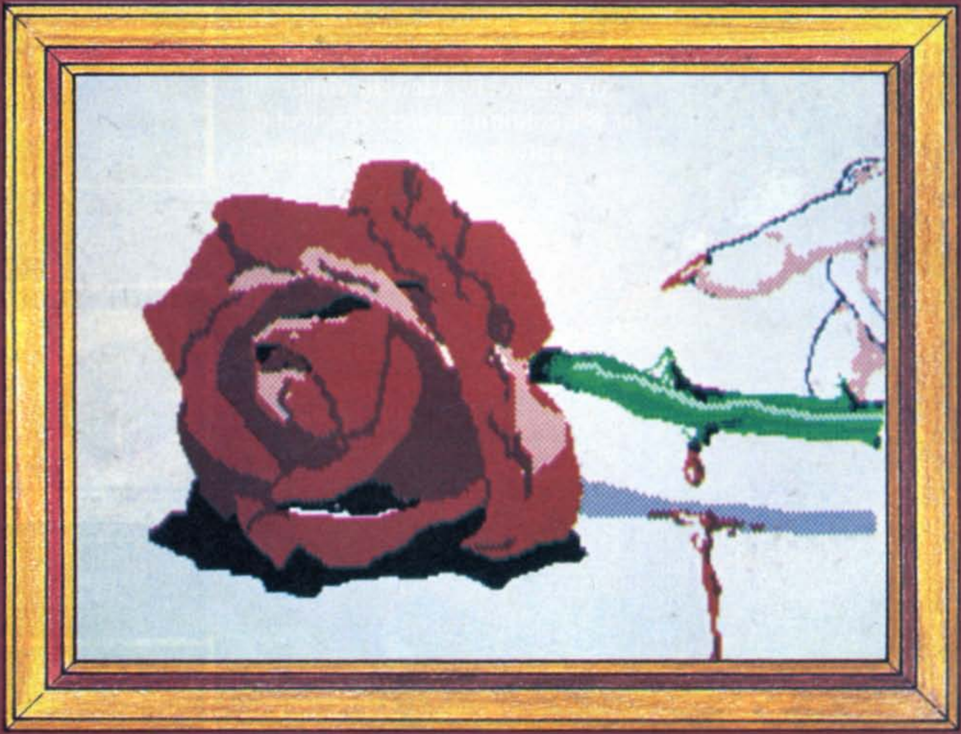
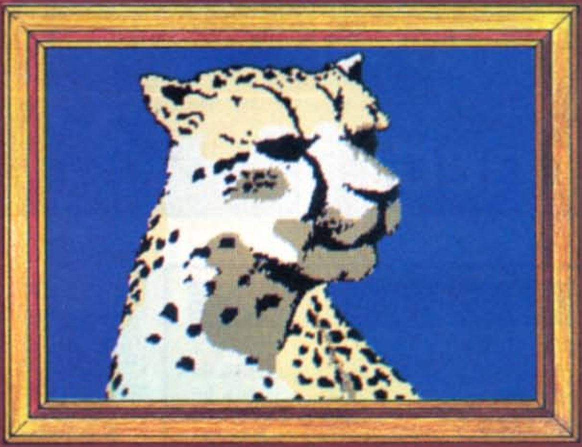
THE MICRO USER GALLERY

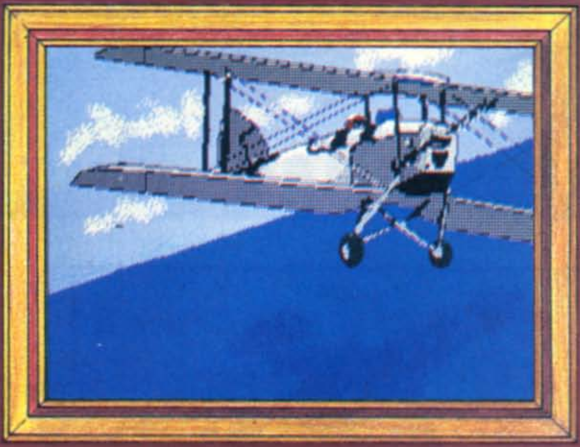
No. 4



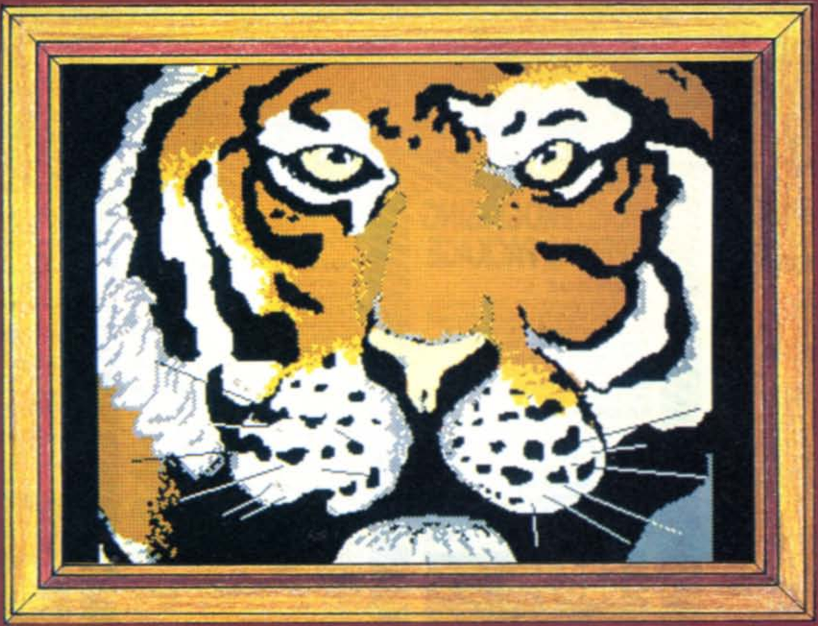
Dying rose



Cheetah



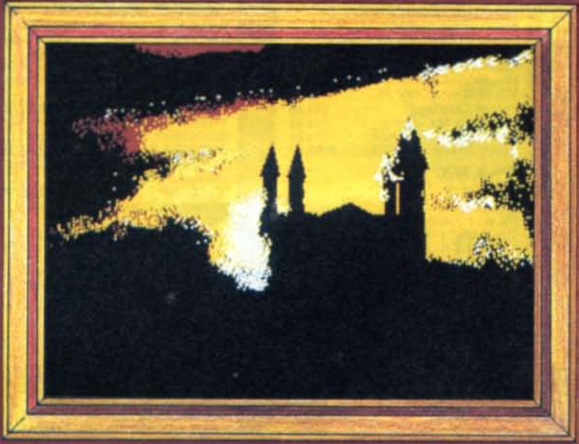
Tiger moth



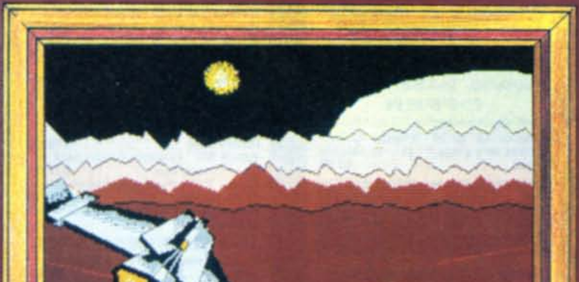
Tiger

THANKS for the pictures that you keep sending us – keep them coming in. This month we feature some works of art by Daniel Lear and Craig Wareham. We don't mind whether it's just one masterpiece or a full gallery that you send us – if your pictures are good you'll see them in print. Please send screen dumps on disc or tape with a note saying which mode they use.

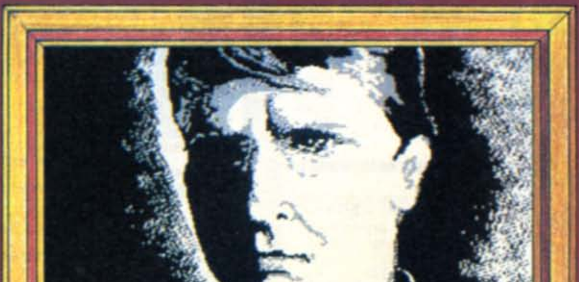
The address to send them to: Gallery, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.



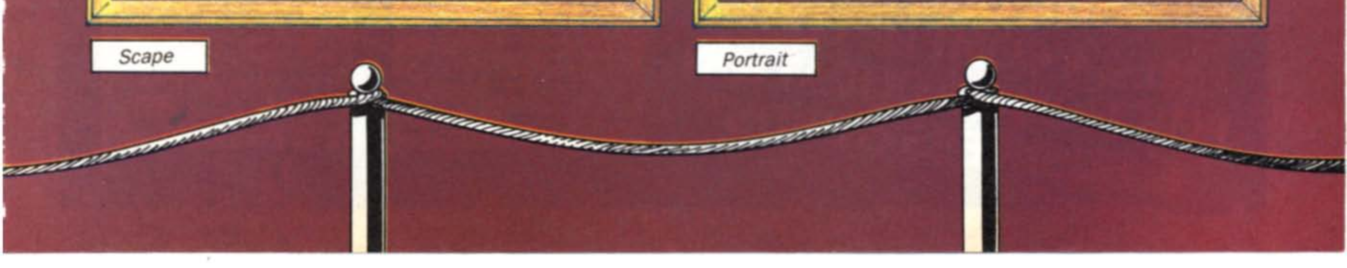
Castle



Scape



Portrait



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NEW

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. **£86.25**

Eprom Cartridge	£14.95
Reference Manual Part I	£14.95
Reference Manual Part 2	£14.95
Acorn Teletext Receiver	£108.00

NEW

FILESTORE

Filestore provides shared access to file and printer services on Econet. The filestore consists of two units – a dual 3.5 inch floppy disc unit 1.2 Mbytes of storage (Filestore EO1) which can be expanded with a high performance 20 Mbyte Winchester disk drive unit(Filestore E20).

FILESTORE EO1	£952.00
FILESTORE E20	£829.00

ECONET ACCESSORIES

100m Cable	£89.00
Station Lead Set	£29.00
Econet Starter Kit	£99.00
Econet Bridge	£199.00
Level I Fileserver 40 Track	£99.00
Level 2 Filesaver 80 Track	£235.00
Print Server Eprom	£49.00

BBC Upgrades

64K Upgrade Kit	£39.95
17/70 Upgrade Kit	£49.94
ADFS ROM	£29.95
Disc Upgrade Kit	£65.00
Econet Upgrade Kit	£49.00
DNFS ROM	£20.00

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Repairs for computer printers
and disk drives. Call
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depatment.

WORD PROCESSING SPECIAL PACKAGE

PACKAGE 1

Based on Master 128. The Twillstar All in One Word Processing Package contains a Master 128, View 3.0, Viewsheet, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. **£899.00**

PACKAGE 2

Based on Master Compact 128. The Twillstar package includes Compact 128, latest version of the View Word processor, single 640K disk drive, monochrome monitor, correspondence quality printer. All connecting cables for above and also 5 disks and some paper. **£635.00**

BBC Master Compact

Twillstar continues to offer the MASTER COMPACT for your Home Education and Business needs! Complete with bundled software and an integral 3.5" Disk Drive in the following Systems:-

SYSTEM 1 (inc. VAT) **£414.00**
128K *Single 640K Drive* *UHF Modulator* *Bundled Software*

SYSTEM 2 (inc. VAT) **£488.75**
As System 1. With *12" High Res. Monochrome Monitor*

SYSTEM 3 (inc. VAT) **£626.75**
As System 1. With *14" Medium Res. RGB Monitor*

SPECIFICATIONS: ★ Compatible with Master Series micro subset ★ 128K RAM inc 64K sideways RAM ★ 64K ROM inc 32K MOS, 16K BASIC ★ Up to 4 internal ROM sockets ★ 3.5" 640K formatted disk drive ★ OUTPUTS: Video/RGB/Printer/ Mouse or Joystick ★ Disk drive ★ (optional) Econet ★ Serial ★ 5V power from disk drive module ★ Usual 8 BBC disply modes inc. Mode 7 ★**BUNDLED SOFTWARE**: Pull down menus * Desk top inc. note pad, calculator * VIEW 3.0 * CARD INDEX * Full LOGO * BBC BASIC 4.0 * ADFS + Utils * Welcome suite * Tutorials * (1770 DFS under licence)

2nd DRIVE KIT	£113.00

Monitors

MONOCHROME MONITORS

Phillips BM 7502
12" hi res. P31 Green Phospher Screen. CVBS input. Audio input. Band width 20 MHz. 2000 CHRS Dispay. Adjustable viewing angle. **£79.00**

Phillips BM 7522 Amber Screen	£95.00
Phillips BM 7542 Dedicated WD phosphor Screen monitor	£95.00
Philips BM 7513 12" Green IBM compatible	£120.00

TAXAN
New Taxan Monochrome Screens

Taxan KX117 12" Green Screen P31	£89.00
Taxan KX118 12" Green Screen P39	£99.00
Taxan KX119 12" PUL Amber Screen	£99.00

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Microvitec 1451 Med Res	£255.00
Microvitec 1441 Hi Res	£391.00
Microvitec 2030 Cs 20 Std Res	£425.50
Microvitec 1431 AP Std Res	£224.25
Microvitec 1451 Ap Med Res	£293.25

PHILLIPS
New from Phillips

Phillips CM8833
14" CVBS and RGB medium resolution colour monitor. IBM PC compatible. Fast blankup to enable superimposing. Stereo Audio. Ear phone socket. 600 dots x 285 lines vertical **£269.00**

Phillips CM8852
14" RGB professional med res colour. 700 dots x 285 **£289.00**

Phillips CM8873
14" RGB high resolution colour monitor Res 850 x 480 **£550.00**

Taxan Super Vision 620

High Resolution colour monitor with several unique features, at an affordable price.

SUPERVISION 620
12" RGB High resolution colour monitor. Fully compatable with IBM, Apple, BBC and most other Personal Computers. 635 x 312 line resolution. Positive or negative sync input. Text colour switchable to green, amber, white or blue or inverse white. Super high contrast tube. Optional tilt-swivel base (with clock/calendar available). Special introductory offer. **£299.00**

NEW SUPERVISION 625
12" high resolution colour monitor. 661 dots x 312 lines **£369.00**

MONITOR TO TV CONVERTER

AV 7300 Colour tuner module Push button control. 12 preset channels. Built in aerial. Compact design. Composite video only **£69.00**

SPECIAL OFFER

Mitsubishi 1404 Medium Resolution Monitor with 640 X 200 Pixels RGB available with IBM or BBC Leads. **£249.00**

SWIVEL BASE OFFER

Special summer price Tilt and swivel base for 12" or 14" monitor or TV. "Looks very elegant" at an ubeatable price. **£9.95**

Disc Drives

MITSUBISHI DISC DRIVES

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 Track switchable at the front and have two years warranty.

5¼" Drives without P.S.U.

MD 400A Single 400K Double Sided	£118.00
MD 802C Dual 400K Double Sided	£219.00

5¼" Drives with P.S.U.

MD 400B Single 400K Double Sided	£135.00
MD 802E Dual 400K Double Sided	£249.00

SPECIAL

MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. **£269.00**

SOURCE DISK DRIVES

Source SD35 3½" disk drive, single drive **£85.00**

Source SD352 3½" dual drive **£149.00**

Supplied cased complete with cables, powered from computer. Extended two year warranty.

Source SD35S 3½" single drive with P.S.U. **£135.00**

Source 352S 3½" dual drive with P.S.U. **£199.00**

Source SD3545S Combo dual 5¼" and 3½" drives with P.S.U. **£249.00**

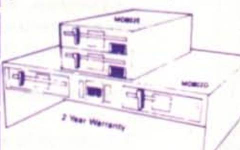
Winchester Disk Drives

Source HD20 Twillstar's 20 Mbyte winchester drive including Acorn DFS ROM complete with P.S.U. **£599.00**

Source HDP201 Twillstar's 20 Mbyte winchester drive and a 400k double sided floppy drive built in a plynth to accomodate monitor on the top and the computer underneath. Includes ADFS ROM and P.S.U. **£869.00**

Source TS10 10 Mbyte tape streamer backup unit with utilities £695.00

Othe size hard disks are available, please call for our latest prises.



Accessories

Taxan KIF 4308 buffer compatible with any Centronics interface printer **£149.00**
Further 64k upgrade available.

Printer/Computer sharers.

2 – 1	£39.00
6 – 1	£79.00

Serial and Parallel T Switches

Parallel T switch	£67.85
Serial T switch	£67.82

FLOPPY DISKS

Raven 5¼" pack of 10 in a clear library box	£15.00
Raven 5¼" rainbow colour pack of 10 in library box	£17.00
Raven 3½" single sided pack of 10 in library box	£18.00
Raven 3½" double sided pack of 10 in library box	£25.00

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Trackmaster 5¼" 70 x 5¼" lockable	£7.95
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200 SHEETS OF PAPAER

When you buy a Panasonic KX-P1081 The faster and enhanced KX-P1081. 120 cps in draft mode. 24 cps in NLQ mode. Fully Epson RX80 and IBM Matrix and Graphics Printers compatible. Standard friction and tractor feed. Operator accesible print mode switch. Standard 8 bit parallel interface. RS232 interface is optional **£179.00**

(Offer ends 31st July 1987)

Juki 5510

- Gives you 180 CPS & NLQ Standards £269.00

Compatibile with both the Epson and the IBM Graphic Printer). Standard 2K memory (expandable to 14K) built-in Parallel Centronics interface and 8-switch international character sets.

If you need colour too, the optional Juki 5510 Colour Kit gives you seven colours. **£112.00**

STAR NL-10

Fine Near-Letter-Quality, 100% compatibility and total reliability all in one easy to use printer. 120 cps in draft mode and 30 cps in near letter quality. **£229.00**

EPSON PRINTERS

Epson FX 800 and FX 1000 range offers superior printing and technical features. 200 cps in draft and 40 cps in NLQ. Complete with tractor and friction feed as standard. Offering IBM compatibility, full graphics. Also includes two NLQ fonts, 10,12,17 and 20 cpi, double height and double width with 8K buffer built in.

FX 800	**£369.00**
FX 1000	**£499.00**
FX 800 Sheetfeeder	**£141.00**
FX 1000 Sheetfeeder	**£163.00**

Epson EX 800/1000 High speed printers. 300 cps in 12 cpi mode. Also offers four colour printing.

EX 800	**£465.00**
EX 1000	**£626.75**
Colour option for both	**£62.00**

Epson LX 86 120 cps Epson & IBM comaptible. Near letter quality. standard centronics interface **£229.00**

Epson LQ 800	**£499.00**
Epson LQ 1000	**£669.00**

CANON 55A

Wide version. Fully IBM compatible. **£399.00**

CANON PW1080A

80 column printer with 160 cps draft and 40 cps NLQ with built in friction and tractor feed. Fully compatible with Epson FX80. Standard parallel interface. **£249.00**

STAR NL-10

Fine Near-Letter-Quality, 100% compatibility and total reliability all in one easy to use printer. **£229.00**

STAR NX-15

Same as Star NL-10 but with 136 column width. Both Epson and IBM compatible **£399.00**

MP200

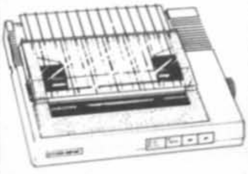
200 cps in draft. 40 cps in NLQ mode. 7K buffer as standard (128 downloadable characters in NLQ) optional 8K memory. IC font cards. **£274.85**

MP201

Same as MP200 with 136 columns **£318.55**

MICRO P MP165

80 Columns. 165 cps in draft mode. 35 cps in NLQ mode. Ultra high resolution graphics. Friction and traction feed. 2 Year warranty. Epson or IBM compatible control codes. **£199.00**



MP135

Just released

135 cps, 80 column printer. Frictio/ tractor feed. NLQ. Epson & IBM Compatible **£145.00**

MP480

New

Fast reliable 480 cps dot matrix printer. 74 cps, NLQ, 80 column, fully Epson & IBM compatible, Std parallel **£349.00**

CITIZEN MSPIOE

The new MSPIO with 160 CPS Draft and 40 CPS NLQ. With TWO years Warranty **£269.00**

CITIZEN MSP-15E

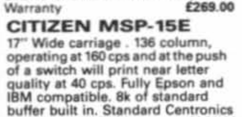
17" Wide carriage . 136 column, operating at 160 cps and at the push of a switch will print near letter quality at 40 cps. Fully Epson and IBM compatible. 8k of standard buffer built in. Standard Centronics are optional RS232 **£379.00**

TAXAN KXP815

Taxan KXP 815 New enhanced KP 810 with 160 cps and fully Epson & IBM Compatible **£299.00**

TAXAN KXP915

Taxan KXP 915 New enhanced KP 915 with 180 cps and fully Epson & IBM Compatible **£420.00**



CITIZEN 120D

Dot Matrix Printer. The 120D precision printer brings to the small business, educational and home user good quality and attention to detail. Its compact size, host of standard features and built in quality and reliability that supports Citizen's unique **full TWO-YEAR warranty** make it a must for all computer users. Fast draft output: 120 cps. Built-in NLQ: 25 cps. IBM and Epson compatible. Plug-in interface cartridge. Tractor and friction feed as standard. Optional cut sheet feeder. **£179.00**

CITIZEN LASER OVERTURE 110

Overture 110 Prints 10 pages per minute. COmes complete with internal controller with print resolution of 300 x 300 dots per inch. Print capability of Standard Text, IBM & Epson bit-map graphics, IBM graphic character set, Epson graphic character set. Resident fonts are: Citizen Pica upright/italic, Citizen Elite upright/italic, Citizen Courier, Citizen Bookface (over 56 typefaces), downloadable one character set in Epson Mode. 11 international character sets. Standard Centronics Parallel and Serial RS232C. Standard 512K memory 384-byte user available. Fully compatible with Epson FX1000 IBM Proprinter & Diablo 630. **£1850.00**

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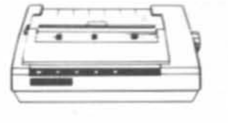
The Complete Solution

INTRODUCES THE NEW TECO VP1814



Dot matrix printer. VP1814 is fast highly reliable and easy to operate.

☆ Standard 80 column

☆The high-speed, low energy consumption 9 wire dot head gives printing speed of 189 cps and NLQ speed 36 cps

☆Bi-directional, Logic seeking in text mode

☆The use of fan-fold, roll or cut-sheet paper is possible with adjustable sproket pin feed and friction feed

☆Offers emphasized, double print, super script, sub script

☆Justified print mode are also available including left, centre, right and full justification

☆9 graphic modes are available

☆Both download and inprint buffer can exist simultaneously

☆7K input buffer standard can be expanded to 15K

☆Printing modes selectable at front panel (NLQ/draft, Pica/Elite, enlarge, emphasize, condense, italic

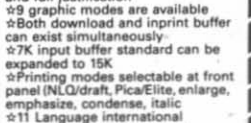
☆11 Language international character font is internalized

☆Both IBM and Epson compatable

MAIN UK DISTRIBUTOR

SPECIAL INTRODUCTORY PRICE (inc. VAT) **£229.00**

DAISYWHEEL



PANASONIC KX-P3131

A Fully Formed Serial Impact Daisywheel printer with print speed of 17cps. Diablo compatible print wheels. Print pitches available are: 10, 12, 15 and proportional spacing. Standard friction feed and optional tractor. Paper width 13.5 inches. Standard Centronics optional RS-232C. Built with 6K text buffer expandable to 32K buffer. **£289.00**

BROTHER HR 20

The new Brother Daisywheel HR 20 8K standard buffer upgradable to 16k. Comes standard with serial and parallel port **£389.00**

JUKI Daisywheel

Juki 6100 **£329.00**

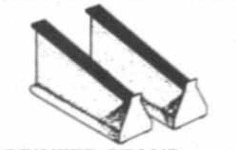
NEW MP26 Daisywheel

MP26 A feature rich very quiet printer. Universal compatibility with almost al personal computers at an unbeatable price. Speed: 26 cps. 132 columns Diablo 630 compatible **£249.00**

Optional Tractorfeed	**£95.00**
Optional Sheet feeder	**£145.00**

MP40

A very fast, quiet printer with features and compaible with virtually all computers at a fantastic price. 40 cps, 132 column, diablo 630 interfacew, parallel interface, built in standard RS232 optional £355.00



PRINTER STAND

Fits nearly any width of printer. Allows paper storage and gives ideal viewing position. Can also be used for computers and monitors. Steel construction prevents bending or buckling **£18.00**

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You can purchase any of the items listed. All you have to do is write your requirements on a sheet of paper, and we will despatch your goods within 24 hours, subject to availability. Please add the following amounts for Postage and Packing.

Items below £10.00	add **£1.50**
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Items below £100.00	add **£3.50**
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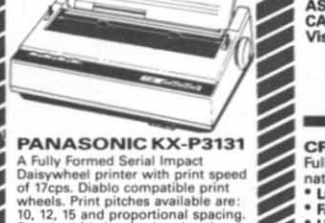

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◀ *From Page 53*

```
   10 REM     Espionage
   20 REM    by J.Metcalf
   30 REM (C) The Micro User
   40 ON ERROR GOTO 2010
   50 MODE4:PROCinit:PROCinst:PROCscreen
:TIME=0:S%=2000:REPEAT
   60 IF INKEY-98 OR (J% AND ADVAL1>jr%)
 PROCdraw(X%,Y%):CALL T%:CALL T%:CALL T%
:A%=A%-10:A%=A%-40*(A%<0):PROCdraw(X%,Y%
)
   70 IF INKEY-67 OR (J% AND ADVAL1<jl%)
 PROCdraw(X%,Y%):CALL T%:A%=A%+10:A%=A%+
40*(A%>30):PROCdraw(X%,Y%)
   80 B%=ADVAL0AND3:IF INKEY-99 OR (J% A
ND B%) IF Y%>670 IF Y%<780 IF X%>550 IF
X%<660 PROCpickup
   90 IF INKEY-38 PROCm(8)
  100 IF INKEY-74 OR (J% AND ADVAL2>jr%)
 PROCmove
  110 IF 2000-(TIME DIV100)<>S% PROCupda
te
  120 UNTIL S%=0
  130 IF H%=2 SOUND4,-15,245,50:PROCm(1)
  140 IF H%<>2 PROCm(2)
  150 PROCend
  160 :
  170 DEFPROCcode
  180 FOR Z%=0TO 2STEP2:P%=T%
  190 [OPTZ%:LDX#0:STX&74:LDX#8:STX&73
  200 .loop1:LDX#0:LDY&74
  210 .loop2:LDA&C00,Y:STA&75,X:INX:INY:
CPY&73:BNE loop2:LDY&74
  220 .loop3:LDX#0:STX&71:STX&70
  230 .loop4:LDA&75,X:STA&71:ASL&71:ROR&
70:LDA&71:STA&75,X:INX:CPX#8:BNEloop4
  240 LDA&70:STA&C00,Y:INY:CPY&73:BNEloo
p3:LDA&74:CMP#24:BEQ end
  250 LDA&73:ADC#8:STA&73:LDA&74:ADC#8:S
TA&74:JMPloop1
  260 .end:RTS
  270 ]NEXT
  280 FOR Z%=0 TO 2STEP2:P%=N%
  290 [OPTZ%:LDX#0:LDA#0
  300 .loop1:STA&71,X:INX:CPX#8:BNE loop
1
  310 CLC:LDX#0:.loop2:ROR&70:ROR&71,X:I
NX:CPX#8:BNE loop2:RTS
  320 ]NEXT
  330 FOR Z%=0 TO 2STEP2:P%=O%
  340 [OPTZ%:LDX&70:LDY#0:.loop1:LDAC1%,
X:STA&C20,Y:LDAC2%,X:STA&C40,Y:INX:INY:C
PY#32:BNEloop1:RTS
  350 ]NEXT
  360 ENDPROC
  370 :
  380 DEFPROCmove
  390 OX%=X%:OY%=Y%
  400 IF A%=10 IF Y%>544 Y%=Y%-16
  410 IF A%=0 IF X%<1088 X%=X%+16
  420 IF A%=30 IF Y%<912 Y%=Y%+16
  430 IF A%=20 IF X%>128 X%=X%-16
  440 *FX19
  450 PROCdraw(OX%,OY%):PROCdraw(X%,Y%)
  460 IF A%=0 IF Y%>703 IF Y%<753 IF X%=
1088 PROCnew(1)
  470 IF A%=20 IFY%>703 IF Y%<753 IF X%=
128 PROCnew(3)
  480 IF A%=30 IF X%>575 IF X%<641 IF Y%
=912 PROCnew(0)
  490 IF A%=10 IF X%>575 IF X%<641 IF Y%
=544 PROCnew(2)
  500 ENDPROC
  510 :
  520 DEFPROCscreen
  530 VDU19,1,0;0;17,129,12,28,1,30,38,2
2,17,128,12:PRINT"TAB(2);"ESPIONAGE by J
.Metcalf"TAB(2);STRING$(22,CHR$255);"
 Time-"
  540 VDU5,28,2,29,37,25:PROCdisplay:VDU
19,1,7;0;
  550 ENDPROC
  560 :
  570 DEFPROCdoor(c%,d%,e%)
  580 IF d%=0 ENDPROC
  590 PLOT4,D%(c%+7),D%(c%+8):FOR I%=1 T
O 8STEP 2:PLOT5,D%(c%+I%),D%(c%+I%+1):NE
XT:PLOT4,D%(13+c%),D%(14+c%):FOR I%=7 TO
 14 STEP 2
  600 PLOT5,D%(I%+c%),D%(I%+1+c%):NEXT:P
LOT4,D%(19+c%),D%(20+c%):FOR I%=13 TO 20
 STEP 2:PLOT5,D%(I%+c%),D%(I%+1+c%):NEXT
  610 IF e%=0 PLOT4,D%(3+c%),D%(4+c%):PL
OT4,D%(5+c%),D%(6+c%):PLOT85,D%(17+c%),D
%(18+c%):PLOT85,D%(15+c%),D%(16+c%)
  620 ENDPROC
  630 :
  640 DEFPROCroom
  650 FOR I%=1 TO 32 STEP 8:PLOT4,U%(I%)
,U%(I%+1):FOR K%=1 TO 3:PLOT5,U%(I%+K%*2
),U%(I%+K%*2+1):NEXT:PLOT5,U%(I%),U%(I%+
1):NEXT
  660 ENDPROC
  670 :
  680 DEFPROCinit:PRINT"Initialising..."
  690 DIMO%40,C1%256,C2%256,T%100,M%40,N
%50,RM%36,OB%36,D%(80),U%(32),D$(15):A%=
0:C%=0:E%=1:F%=0:G%=0:H%=0:Q%=0:R%=0:X%=
608:Y%=720
  700 FORI%=0TO15:READD$(I%):NEXT
  710 PROCdread(RM%,35,2)
  720 PROCdread(OB%,35,1)
  730 FOR I%=0 TO 3:PROCdread(I%*64+C1%,
63,2):NEXT
  740 FOR I%=0 TO 3:PROCdread(I%*64+C2%,
63,2):NEXT
  750 FOR J%=0 TO 1:READ A$:FOR I%=1 TO
40:D%(I%+40*J%)=EVAL("&"+MID$(A$,I%*2-1,
2)+"*20"):NEXT:NEXT
  760 READ A$:FOR I%=1 TO 32:U%(I%)=EVAL
("&"+MID$(A$,I%*2-1,2)+"*20"):NEXT
  770 VDU23,255,0,0,0,51,204,0,0,0,23,22
4,0,1,3,7,4,7,12,8,23,225,96,240,248,220
,72,160,208,80,23,226,12,7,4,7,3,1,0,0,2
3,227,208,160,72,220,248,240,96,0
  780 NL$=CHR$8+CHR$8+CHR$10
  790 $(M%+0)=CHR$224+CHR$225+NL$+CHR$22
6+CHR$227:$(M%+10)=CHR$226+CHR$224+NL$+C
HR$227+CHR$225
  800 $(M%+20)=CHR$227+CHR$226+NL$+CHR$2
25+CHR$224:$(M%+30)=CHR$225+CHR$227+NL$+
CHR$224+CHR$226
  810 O1$=CHR$228+CHR$229+NL$+CHR$230+CH
R$231:O2$=CHR$232+CHR$233+NL$+CHR$234+CH
R$235
  820 ENVELOPE 1,2,3,4,5,6,7,8,100,0,0,-
1,100,100
  830 PROCcode:jl%=23000:jr%=43000
  840 ENDPROC
  850 :
  860 DEFPROCdraw(X%,Y%):*FX19
  870 MOVEX%,Y%:PRINT$(M%+A%)
  880 ENDPROC
  890 :
  900 DEFPROCnew(l%)
  910 ?&70=RM%?R%
  920 CALL N%
  930 IF l%?&71=0 ENDPROC
  940 IF R%=11 IF C%=1 IF l%=0 IF ?(&71+
l%+4) PROCm(3):RM%?R%=RM%?R%-16:GCOL0,0:
PROCdoor(0,1,0):GCOL0,4:?(&71+l%+4)=0:PR
OCw(5000)
  950 IF ?(&71+l%+4) PROCm(4):SOUND1,-10
,1,10:PROCw(500):ENDPROC
  960 IF l%=0 Y%=560:R%=R%-6
  970 IF l%=2 Y%=896:R%=R%+6
  980 IF l%=1 X%=144:R%=R%+1
  990 IF l%=3 X%=1072:R%=R%-1
 1000 IF R%=18 IF Q%=0 GOSUB 1630
 1010 PROCdisplay
 1020 IF R%=34 IF E% IF C%<>11 GOSUB 162
0
 1030 IF R%=28 IF E% IF C%<>11 PROCm(5)
 1040 IF R%=0 IF H%>1 IF F%=2 PROCwin
 1050 ENDPROC
 1060 :
 1070 DEFPROCm(n%)
 1080 M$=FNm(n%):VDU4,12:e%=0:I%=0:REPEA
T:FOR K%=0 TO 35:IF MID$(M$,K%+I%,1)=" "
 SP%=K% ELSE IF MID$(M$,K%+I%,1)="." SP%
=K%+1:e%=1
 1090 NEXT:PRINTMID$(M$,I%,SP%);CHR$13;C
HR$10;:I%=I%+SP%+1:UNTIL e%:VDU5
 1100 ENDPROC
 1110 :
 1120 DEFPROCdisplay
 1130 VDU24,0;400;1270;1013;18,0,129,18,
0,0,16:PROCroom:?&70=?(RM%+R%):CALL N%
 1140 FOR K%=0 TO 3:PROCdoor((20*K%),?(&
71+K%),?(&75+K%)):NEXT:PROCdrawobj:PROCm
(6):GCOL4,1:PROCdraw(X%,Y%)
 1150 ENDPROC
 1160 :
 1170 DEFPROCdrawobj
 1180 V%=?(OB%+R%):?&70=(V% MOD8)*32:CAL
L O%:IF V%>7 MOVE608,720:PRINTTAB(19,9)O
2$ ELSE MOVE608,720:PRINTTAB(19,9)O1$
 1190 ENDPROC
 1200 :
 1210 DEFPROCpickup
 1220 V%=?(OB%+R%):IF V%=0 ENDPROC ELSE
ON V% GOSUB 1240,1500,1240,1240,1240,124
0,1570,1600,1240,1550,1240,1530,1240,124
0,1640
 1230 ENDPROC
 1240 PROCdrawobj:?(OB%+R%)=C%:C%=V%:PRO
Cdrawobj:PROCm(7)
 1250 ENDPROC
 1260:
 1270 DEFPROCupdate
 1280 VDU4,26:S%=2000-(TIME DIV100):V$=R
IGHT$(STR$(S%),2):IF VAL(V$)=99 S%=S%-59
:TIME=TIME+4000:V$="59"
 1290 IF VAL(V$)<10 V$=RIGHT$(STR$(S%),1
):U$="0":V$=U$+V$
 1300 IF (S% DIV100)<10 PRINTTAB(33,24);
"0";STR$(S% DIV100);":";V$ ELSE PRINTTAB
(33,24);STR$(S% DIV100);":";V$
 1310 VDU28,2,29,37,25,5
 1320 ENDPROC
 1330 :
 1340 DATA nothing,a key,a bomb,a book,a
 monkey wrench,a plastic card,a floppy d
isc,a BBC micro,a burglar alarm,some wir
e cutters
 1350 DATA a sonic emmiter,some ear muff
s,a security computer,some encoded docum
ents,a cassette,an oscilloscope with tap
e deck
 1360 DATA 04060A0C0404070904030B1905040
38A0E0C030F0E0E0905020905050609028A09010
308
 1370 DATA 0090360070008B0F0100000040E00
0DC05A2
```

```
 1380 DATA00000000000000000000000000000000
00000000000000000000000000000000000000C18
3E1C0F07030000000008080000800100000FE838383
FEC0E07E33F12933DE
 1390 DATAF8243FFFFF3F24F80000F8FCFCF808
04409F753F353F351F08FF41D541FF57FE000000
7C8291AD810000007C82126A02B581FD7B000000
005A027CB80000000
 1400 DATA000007080F0101070000C020A0A020
2005030101010101016040404040404080000000
000F18121200000000FC06AAA2121012180F0000
002A8AAA06FC000000
 1410 DATAFF8787FFFFFCF9FBFFFFFEFFFF3F9F
DFFBF9FCFFFEFEFEFFDF9F37FF7F7F7FFF030604
041C373B68FE0301010 1FFFE00DFF090959095F0
1FFF010155015501FF
 1420 DATA0205047FD5FFD5FF285482FEFF1155
15D3A991B991A9CB7FFFF78B0525078FFE000040
B8C73807000000000003EF13FF8000738C7B84000
00FF31FE0000000000
 1430 DATA50AC82FF407B6A7A000000E327BFBF
BF407F4055407F22773FE725AC3CEC440000000F
10275850500000F008F41A0A0A5038285C5C7C38
180A1C142E2E3E1C18
 1440 DATA7FD8D8DFDADFDADFFE0303FFABFFAB
FFDADFF8DBABE9D87FABFF010DFDF101FE304868
5F40535A5306090BFD01494169405B525B601F00
0001B1A9B103FC0000
 1450 DATA007FFFEFC4ECFFFF00FEFFF72337FF
FFC0BF7F00000000003FDFE000000000001C14
141C08385C000000000000000007FFFEED5BBFF7F
20FEEFC56FFDD7FE04
 1460 DATA1D2D1D2E1C301B301B312531253024
30232E232D39263A263C273C283D283D1E3C1E3C
1F3A203920
 1470 DATA231923182416251625151B151B161C
161D181D1907200620041F041E031E0328042804
2706260726
```

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```
 1480 DATA02323E323A2E062E0232062E061802
143A2E3E323E143A18061802143E143A18
 1490 :
 1500 IF C%=4 AND H%=0 PROCm(9):H%=1:RET
URN
 1510 IF C%=3 AND H%=1 PROCm(10):IF S%>6
0 H%=2:TIME=188000:RETURN ELSE IF C%=3 A
ND H%=1 H%=3:RETURN
 1520 GOTO 1560
 1530 IF C%=5 AND G%=0 ?(RM%+31)=?(RM%+3
1)-128:G%=1:PROCm(11):GCOL0,0:PROCdoor(6
0,1,0):GCOL4,1:RETURN
 1540 PROCm(12):RETURN
 1550 IF E% PROCm(13):E%=0:RETURN
 1560 PROCm(14):RETURN
 1570 IF C%=6 IF F%=0 F%=1:PROCm(15):RET
URN
 1580 IF C%=13 IF F%=1 F%=2:PROCm(16):RE
TURN
 1590 PROCm(17):RETURN
 1600 IF Q%=1 GOTO 1540 ELSE IF C%=9 Q%=
1:PROCm(18):RETURN
 1610 PROCm(19):RETURN
 1620 PROCm(20):PROCw(10000):PROCend
 1630 PROCm(21):SOUND1,1,200,100:PROCw(5
0000):PROCend
 1640 IF C%=14 AND ?(RM%+R%)>128 PROCm(2
2):?(RM%+R%)=?(RM%+R%)-128:GCOL0,0:PROCd
oor(60,1,0):GCOL4,1:RETURN
 1650 PROCm(23):RETURN
 1660 :
 1670 DEFPROCwin
 1680 VDU22,4,23;8202;0;0;0;
 1690 PRINTTAB(11,2)"CONGRATULATIONS!"'T
AB(11);"----------------"''"   You have s
tolen the secret formula"'"and destroyed
 the laboratories.You are"
 1700 PRINT"paid for your efforts and ar
e instantly"'"signed up by the anti-vivi
section"'"league!"''TAB(11)"Press SPACE.
"

 1710 REPEAT UNTIL GET=32
 1720 PROCend
 1730 ENDPROC
 1740 :
 1750 DEFPROCinst
 1760 VDU23;8202;0;0;0;
 1770 PRINTTAB(11,5)"ESPIONAGE by J.Metc
alf."'TAB(11)"-----------------------"''
"MISSION  : Steal enemy formula and blow
"'TAB(11)"up base-to cover all traces-"
 1780 PRINTTAB(11)"and return to startin
g place"'TAB(11)"before guards come on d
uty"'TAB(11)"in 20 minutes - GOOD LUCK!"
''"CONTROLS : Z       - left"
 1790 PRINTTAB(11)"X        - right"'TAB(1
1)"RETURN - forwards"'TAB(11)"I        - i
nventory"'TAB(11)"SPACE  - pick-up/use o
bject"'TAB(11)"ESCAPE - re-start/quit"
 1800 PRINT''TAB(11)"Joystick (Y/N) :";
:IF FNyesno J%=TRUE ELSE J%=FALSE
 1810 ENDPROC
 1820 :
 1830 DEFPROCend
 1840 VDU22,7,23;8202;0;0;0;
 1850 *FX15,0
 1860 PRINT'TAB(11)"Replay (Y/N) :";
 1870 IF FNyesno RUN ELSE END
 1880 :
 1890 DEFPROCw(t):t=t/100
 1900 LOCAL T%:T%=TIME+t
 1910 REPEATUNTILTIME>T%:ENDPROC
 1920 :
 1930 DEFPROCdread(ad%,n%,g%)
 1940 READ A$:FOR i%=0 TO n%
 1950 ad%?i%=EVAL("&"+MID$(A$,i%*g%+1,g%
))
 1960 NEXT:ENDPROC
 1970 :
 1980 DEFFNyesno
 1990 A$=GET$:PRINTA$:=INSTR("Yy",A$)
 2000 :
 2010 IF ERR=17 PROCend
 2020 MODE7:PRINT" at line ";ERL
 2030 END
 2040 :
 2050 DEFFNm(n%)
 2060 GOTO (2060+10*n%)
 2070 ="You didn't get out of the buildi
ng in time - You were blown up by the bo
mb you set."
 2080 ="You have run out of time - the n
ext watch are on duty and you are soon c
aught."
 2090 ="You unlock the door with the key
."
 2100 ="This door is locked."
 2110 ="You can see nothing - But a soun
d emanating from the room to the south i
s hurting your ears."
 2120 ="You can see "+D$(OB%?R%)+"."
 2130 ="You can see "+D$(OB%?R%)+"."
 2140 ="You have "+D$(C%)+"."
 2150 ="You fix the bomb with the "+RIGH
T$(D$(C%),6)+" - Now you turn your atten
tion to the numerical keyboard below."
 2160 ="You switch on the bomb using the
 code in the "+RIGHT$(D$(C%),7)+", it wi
ll go off in 1 minute 20 seconds."
 2170 ="You insert the "+RIGHT$(D$(C%),4
)+" into the slot,and the door opens."
 2180 ="This machine is fastened to the
floor, it cannot be taken."
 2190 ="You kick it until it turns itsel
f off."
 2200 ="You go to pick it up but it is t
oo heavy."
 2210 ="You insert the translation "+RIG
HT$(D$(C%),4)+"into the computer, now fi
nd something to translate."
 2220 ="The formula is translated as e=m
c2."
 2230 ="Unfortunately nobody has left an
y games to play."
 2240 ="You vandalise the alarm with the
 "+RIGHT$(D$(C%),12)+"."
 2250 ="It has an electrified force fiel
d around it so it cannot be touched."
 2260 ="There is "+D$(OB%?R%)+" in this
room, your eardrums have burst and unfor
tunately you have vegitated."
 2270 ="You set the alarm off - Oh dear,
never mind."
 2280 ="The recording on the "+RIGHT$(D$
(C%),8)+" has the same voice pattern as
that required to open the door."
 2290 ="You speak into the microphone an
d the oscilloscope display goes up and d
own but that is all."
```

This listing is included in this month's tape & disc offer. See order form on Page 151.

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 502D D
 50 = 8C77 8
 60 =  552 9
 70 = 9ACE 2
 80 = 5C95 4
 90 = 9029 A
100 = 836D 6
110 =  B0B A
120 = 1100 6
130 = 8301 D
140 =  C75 D
150 =  6B9 D
160 = 9719 6
170 = 1F9B 0
180 = FC51 A
190 = F12A 3
200 = CFB0 C
210 = ABA9 7
220 = 2A90 2
230 = 9E37 4
240 = 8901 1
250 = 3646 8
260 = BCA4 6
270 = 5460 1
280 =  F29 6
290 = 8381 1
300 = 73E6 A
310 = 5A3E 0
320 = 5460 6
330 = 3C18 3
340 = 8EC8 6
350 = 5460 0
360 = ED0F 2
370 = 9719 2
380 = D8D0 7
390 =  E61 8
400 = F89C 1
410 = 84CD 0
420 = 4751 1
430 = FE69 5
440 = 61AE 8
450 = 54A8 0
460 = 7D34 0
470 = DCCD 8
480 = 69E6 0
490 = 9C02 B
500 = ED0F F
510 = 9719 D
520 = F5B9 6
530 = AEA3 E
540 = 1358 6
550 = ED0F 9
560 = 9719 1
570 = A7E8 A
580 = 90AE F
590 = F68D C
600 = FB24 6
610 = 1457 6
620 = ED0F 3
630 = 9719 D
640 = 2F7A 3
650 = D684 8
660 = ED0F C
670 = 9719 9
680 = 2A12 7
690 = 678E 8
700 = D95B 6
710 = 544C 1
720 = D510 1
730 = 82F3 C
740 = 333C D
750 = FD41 4
760 = CDEB 3
770 = 4C00 B
780 = 8D38 0
790 =  49C F
800 = 13B8 0
810 =  754 8
820 = 440D 3
830 = 4C61 B
840 = ED0F 1
850 = 9719 8
860 = 6336 3
870 = F69B 2
880 = ED0F A
890 = 9719 C
900 = D88B D
910 = 3B77 E
```

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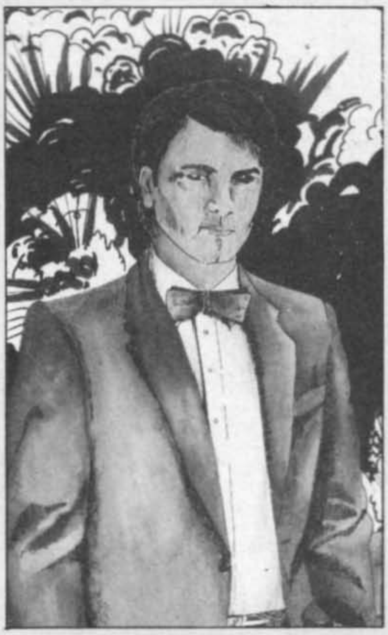
◄ From Page 131

```
 920 = 5358 C|1150 = ED0F 1|1380 = 32B0 F
 930 = EDB5 0|1160 = 9719 2|1390 = 34D9 6
 940 = 771B C|1170 = 24A6 3|1400 = 30CF 6
 950 = B89D E|1180 =  F28 3|1410 =  C89 1
 960 = A8A3 2|1190 = ED0F E|1420 = B43C 1
 970 = 65D5 4|1200 = 9719 F|1430 = 2090 F
 980 = B285 A|1210 = FB69 C|1440 = FE4B 6
 990 = E7BB 0|1220 =  C6E 0|1450 =  38F 6
1000 = 7614 4|1230 = ED0F 7|1460 = 2F72 7
1010 = 2F83 B|1240 = 8895 2|1470 = AB4E C
1020 = D023 0|1250 = ED0F D|1480 = 84BA E
1030 = 9806 C|1260 = 9719 1|1490 = 9719 E
1040 = 8043 6|1270 = F307 9|1500 = FD73 B
1050 = ED0F C|1280 = C9F8 1|1510 = 2F21 8
1060 = 9719 8|1290 = 9ABA 0|1520 =  929 9
1070 = F781 1|1300 = 69C3 9|1530 = 32BE 8
1080 = CEF3 7|1310 = B091 B|1540 = 5851 B
1090 = 6903 D|1320 = ED0F 9|1550 = 81FF 3
1100 = ED0F 9|1330 = 9719 E|1560 = 7FC8 5
1110 = 9719 2|1340 = 4488 7|1570 = 28F1 7
1120 = C225 4|1350 = 116F A|1580 = F04A 4
1130 = 52B0 B|1360 = 47BA 9|1590 = E414 8
1140 = 8F44 0|1370 = 2638 6|1600 =  841 4
```



```
1610 = 464E 7|1840 = A038 2|2070 = CFD6 6
1620 = 1C9D 4|1850 = 6C86 B|2080 = 7AD1 D
1630 = BC5F 1|1860 = 1516 0|2090 = 38E1 0
1640 = BB7C 3|1870 = 344D 9|2100 =  6B6 B
1650 = C037 D|1880 = 9719 0|2110 = 1226 5
1660 = 9719 B|1890 = 5FD3 4|2120 = FDDE 3
1670 =  5FF 0|1900 = B657 5|2130 = FDDE 2
1680 = 4875 D|1910 = 5D4E 8|2140 =  2D3 D
1690 = 415D 2|1920 = 9719 1|2150 = 9217 5
1700 = A453 1|1930 = 4F16 9|2160 = 1022 D
1710 = 2B9E B|1940 = BDE3 8|2170 = F5BA D
1720 =  6B9 0|1950 = 6451 0|2180 = BE71 4
1730 = ED0F 9|1960 = E531 B|2190 = 3A62 A
1740 = 9719 8|1970 = 9719 5|2200 = 2C85 7
1750 = D8F4 A|1980 = 28B4 8|2210 = 51AD E
1760 = F716 9|1990 = E10D 7|2220 = 5287 5
1770 = D3B3 0|2000 = 9719 F|2230 = 9D23 6
1780 = D59F 6|2010 = 1B39 7|2240 = 177D 3
1790 = 128C D|2020 = 459A E|2250 = C94F 8
1800 = F0F7 2|2030 = FD2E 9|2260 = F4D7 9
1810 = ED0F 9|2040 = 9719 4|2270 = F877 E
1820 = 9719 9|2050 =  AF4 D|2280 = AE80 4
1830 = 1021 1|2060 = F55F F|2290 = 2D6D 1
```

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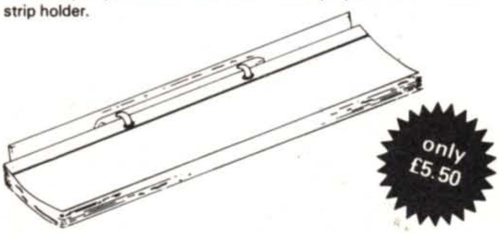

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- ★ Label sets and envelopes included
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Bargain Box.

Have no doubts – these prices are the business. DDS offer you branded SCOTCH (made by 3M) at prices below other people's plain label disks. They're certified & tested error free by 3M; branded disks in tyvek envelopes with re-inforced hubs, labels & WP tabs are also included.
We only have a limited stock, and so it's first come, first served. A saving not to be missed!

	Price per order qty. (SSDD 48 or 96tpi please specify)	Approx price per disk ex-VAT (infor only)
20 disks	£ 10.99	48
40 disks	£ 19.99	44
60 disks	£ 28.99	42
80 disks	£ 36.99	40
100 disks	£ 42.99	38
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500 disks	£199.99	35
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It'll twist your tongue, but not your pocket!

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25 Universal 96 tpi coloured disks, 5 disks of each of five different colours.

Code your files and programs using DDS 'Rainbows'. Without doubt the best quality and value coloured disk on the market.

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How to order

ALL PRICES INCLUDE VAT & DELIVERY TO YOUR DOOR! NO HIDDEN EXTRAS

1. DIAL-A-DISK ON 01.979 7811, and give your ACCESS or VISA number and expiry date.
2. Send your cheque etc. to Direct Disk Supplies Ltd.,
3. Official Orders, Bona-fide orders from Universities, Colleges, Schools, Charities, etc are very welcome.
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☎ 01-979 7811

Access

VISA

Direct Disk Supplies Ltd.

FREEPOST, 129 High Street,
Hampton Hill, Middlesex TW12 1BR

◄ From Page 37

```
 890  LDX Rnum
 900  PLA:PLP
 910  RTS
 920 .recon
 930  LDX Rnum
 940  LDA Rflg,X
 950  BEQ end
 960  JSR setvecs
 970  JSR show
 980  JSR osnewl
 990  CLC:BCC end
1000 .init
1010  LDX Rnum
1020  LDA #&00
1030  STA Rflg,X
1040  BEQ end
1050 .help
1060  LDA (line),Y
1070  CMP #&0D
1080  BNE end
1090  JSR osnewl
1100  LDX #&00
1110 .help2
1120  LDA title,X
1130  BEQ help3
1140  JSR oswrch
1150  INX
1160  BNE help2
1170 .help3
1180  JSR osnewl
1190  LDX #&00
1200 .help4
1210  LDA keyword,X
1220  BNE help5
1230  JSR osnewl
1240  CLC:BCC end
1250 .help5
1260  JSR oswrch
1270  INX
1280  BNE help4
1290 .command
1300  LDX #&01
1310 .compare
1320  INX
1330  LDA keyword,X
1340  CMP #ASC" "
1350  BEQ yes
1360  LDA (line),Y
1370  INY
1380  CMP #ASC"."
1390  BEQ yes
1400  AND #&5F
1410  CMP keyword,X
1420  BEQ compare
1430  BNE end
1440 .yes
1450  LDA #&75
1460  JSR osbyte
1470  TXA
1480  ROR A
1490  BCC notvdu2
1500 .printer
1510  LDA #working
MOD 256
1520  LDY #working
DIV 256
1530  JMP error
1540 .notvdu2
1550  TYA:PHA
1560  LDA #&EC
1570  LDX #&00
1580  LDY #&FF
1590  JSR osbyte
1600  TXA
1610  AND #&08
1620  BNE printer
1630  PLA:TAY
1640  LDA (line),Y
1650  CMP #&0D
1660  BEQ buffon
1670  AND #&5F
1680  CMP #ASC"C"
1690  BEQ buffout
1700  JMP buffoff
1710 .buffout
1720  JSR clear
1730  JMP exit
1740 .buffon
1750  LDY Rnum
1760  LDA Rflg,Y
1770  BEQ move
1780  JMP sayon
1790 .move
1800  LDA zero
1810  PHA
1820  LDA zero+1
1830  PHA
1840  LDX #blockend
-block
1850 .move2
1860  LDA block-1,X
1870  STA tran-1,X
1880  DEX
1890  BNE move2
1900  LDA #&AA
1910  LDY #&FF
1920  JSR osbyte
1930  STX zero
1940  STY zero+1
1950  LDA #00
1960  STA Rmax
1970  STA tinp
1980  STA tout
1990  LDA #&80
2000  STA tinp+1
2010  STA tout+1
2020  LDY #&10
2030 .find
2040  DEY
2050  BMI found
2060  LDA (zero),Y
2070  BNE find
2080  SEC
2090  JSR tran
2100  CLC
2110  JSR tran
2120  CMP #&00
2130  BNE find
2140  LDA #&FF
2150  SEC
2160  JSR tran
2170  CLC
2180  JSR tran
2190  CMP #&FF
2200  BNE find
2210  LDX Rmax
2220  TYA
2230  STA Rtab,X
2240  INC Rmax
2250  BNE find
2260 .found
2270  PLA
2280  STA zero+1
2290  PLA
2300  STA zero
2310  DEC Rmax
2320  BPL connect
2330  LDA #nospare
MOD 256
2340  LDY #nospare
DIV 256
2350  JMP error
2360 .connect
2370  JSR clear
2380  JSR setvecs
2390 .sayon
2400  JSR show
2410 .exit
2420  PLA:TAY
2430  LDX Rnum
2440  PLA
2450  LDA #&00
2460  PLP
2470  RTS
2480 .buffoff
2490  LDY Rnum
2500  LDA Rflg,Y
2510  BEQ boff3
2520  LDA mpty
2530  BNE boff1
2540  LDA #active M
OD 256
2550  LDY #active D
IV 256
2560  JMP error
2570 .boff1
2580  LDX #&05
2590  SEI
2600 .boff2
2610  LDA nins,X
2620  STA insv,X
2630  DEX
2640  BPL boff2
2650  INX
2660  JSR mark
2670 .boff3
2680  JSR show
2690  JMP exit
2700 .show
2710  LDA #buffer M
OD 256
2720  LDY #buffer D
IV 256
2730  JSR print
2740  LDX Rnum
2750  LDA Rflg,X
2760  BNE showon
2770  LDA #off MOD
256
2780  LDY #off DIV
256
2790  JSR print
2800  BEQ show2
2810 .showon
2820  LDA #on MOD 2
56
2830  LDY #on DIV 2
56
2840  JSR print
2850  LDA Rmax
2860  CLC
2870  ADC #ASC"1"
2880  JSR oswrch
2890 .show2
2900  JMP osnewl
2910 .clear
2920  LDA Rmax
2930  STA Rinp
2940  STA Rout
2950  LDA #&00
2960  STA tout
2970  STA tinp
2980  STA full
2990  LDA #&80
3000  STA tout+1
3010  STA tinp+1
3020  LDA #&01
3030  STA mpty
3050  RTS
3060 .setvecs
3070  LDA zero
3080  PHA
3090  LDA zero+1
3100  PHA
3110  LDX #&00
3120  LDY #&FF
3130  LDA #&A8
3140  JSR osbyte
3150  STX zero
3160  STY zero+1
3170  LDA #insv MOD
256
3180  LSR A
3190  CLC
3200  ADC #insv MOD
256
3210  TAY
3220  PHA
3230  LDX #&00
3240 .setv2
3250  LDA address,X
3260  STA (zero),Y
3270  LDA insv,X
3280  STA nins,X
3290  INX
3300  INY
3310  LDA address,X
3320  STA (zero),Y
3330  LDA insv,X
3340  STA nins,X
3350  INX
3360  INY
3370  LDA Rnum
3380  STA (zero),Y
3390  INY
3400  CPX #&06
3410  BNE setv2
3420  PLA:TAY
3430  PLA
3440  STA zero+1
3450  PLA
3460  STA zero
3470  SEI
3480  LDX #&00
3490 .setv3
3500  TYA
3510  STA insv,X
3520  LDA #extvec D
IV 256
3530  STA insv+1,X
3540  INY
3550  INY
3560  INY
3570  INX
3580  INX
3590  CPX #&06
3600  BNE setv3
3610 .mark
3620  LDY Rnum
3630  TXA
3640  STA Rflg,Y
3650  RTS
3660 .print
3670  STA zero
3680  STY zero+1
3690  LDY #&00
3700 .print2
3710  LDA (zero),Y
3720  BEQ print3
3730  JSR oswrch
3740  INY
3750  BNE print2
3760 .print3
3770  RTS
3780 .error
3790  STA zero
3800  STY zero+1
3810  LDY #&00
3820  STY stak
3830  STY stak+1
3840  DEY
3850 .error2
3860  INY
3870  LDA (zero),Y
3880  STA stak+2,Y
3890  BNE error2
3900  JMP stak
3910 .nospare
3920  EQUS "No spar
e RAM"
3930  BRK
3940 .active
3950  EQUS "Buffer
active"
3960  BRK
3970 .working
3980  EQUS "Printer
working"
3990  BRK
4000 .buffer
4010  EQUS "Buffer
"
4020  BRK
4030 .on
4040  EQUS "16k * "
4050  BRK
4060 .off
4070  EQUS "OFF"
4080  BRK
4090 .keyword
4100  EQUS "  BUFFE
R (C/O)"
4110  BRK
4120 .address
4130  EQUW insert
4140  EQUW remove
```

This is one of hundreds of programs now available FREE for downloading on MicroLink

```
4150  EQUW count
4160 .insert
4170  PHP
4180  SEI
4190  CPX #&03
4200  BEQ insert2
4210  PLP
4220  JMP (nins)
4230 .insert2
4240  PHA
4250  STA Xsto
4260  TXA:PHA
4270  TYA:PHA
4280  LDX full
4290  BEQ insert3
4300  PLA:TAY
4310  PLA:TAX
4320  PLA
4330  PLP
4340  SEC
4350  RTS
4360 .insert3
4370  LDY Rinp
4380  LDA Rtab,Y
4390  TAY
4400  LDX Xsto
4410  SEC
4420  JSR tran
4430  INC tinp
4440  BNE insert4
4450  INC tinp+1
4460  LDA tinp+1
4470  CMP #&C0
4480  BNE insert4
4490  LDA #&80
4500  STA tinp+1
4510  DEC Rinp
4520  BPL insert4
4530  LDA Rmax
4540  STA Rinp
4550 .insert4
4560  JSR equal
4570  BNE insert5
4580  ROL full
4590 .insert5
4600  LDA #&00
4610  STA mpty
4620  PLA:TAY
4630  PLA:TAX
4640  PLA
4650  PLP
4660  CLC
4670  RTS
4680 .remove
4690  PHP
4700  SEI
4710  CPX #&03
4720  BEQ remove2
4730  PLP
4740  JMP (nrem)
4750 .remove2
4760  PHA
4770  LDA mpty
4780  BEQ remove3
4790  PLA
4800  PLP
4810  SEC
4820  RTS
4830 .remove3
4840  TXA:PHA
4850  TYA:PHA
4860  BVC remove5
4870  JSR read
4880 .remove4
4890  TAY
4900  PLA
4910  PLA
4920  TAX
4930  PLA
4940  TYA
4950  PLP
4960  CLC
4970  RTS
4980 .remove5
4990  JSR read
5000  PHA
5010  INC tout
5020  BNE remove6
5030  INC tout+1
5040  LDA tout+1
5050  CMP #&C0
5060  BNE remove6
5070  LDA #&80
5080  STA tout+1
5090  DEC Rout
5100  BPL remove6
5110  LDA Rmax
5120  STA Rout
5130 .remove6
5140  JSR equal
5150  BNE remove7
5160  ROL mpty
5170 .remove7
5180  LDA #&00
5190  STA full
5200  PLA
5210  CLC
5220  BCC remove4
5230 .count
5240  PHP
5250  CPX #&03
5260  BNE nocount
5270  PLP
5280  PHP
5290  BVC count2
5300  LDA #&F5
5310  LDX #&00
5320  LDY #&FF
5330  JSR osbyte
5340  TXA
5350  BNE nocount
5360  JSR clear
5370  PLP
5380  RTS
5390 .nocount
5400  PLP
5410  JMP (ncnp)
5420 .count2
5430  LDX #&00
5440  LDY #&00
5450  LDA full
5460  BNE count6
5470  SEC
5480  LDA tinp
5490  SBC tout
5500  LDA tinp+1
5510  SBC tout+1
5520  LDA Rout
5530  SBC Rinp
5540  BCC count3
5550  JSR subout
5560  CLC
5570  BCC count4
5580 .count3
5590  JSR subinp
5600 .count4
5610  STX Xsto
5620  STY Ysto
5630  LDX Rmax
5640  INX
5650  TXA
5660  JSR size
5670  LDA mpty
5680  BNE count6
5690  CPX #&FF
5700  BNE count5
5710  CPY #&FF
5720  BNE count5
5730  INX
5740  INY
5750 .count5
5760  TXA
5770  SEC
5780  SBC Xsto
5790  TAX
5800  TYA
5810  SBC Ysto
5820  TAY
5830 .count6
5840  PLP
5850  RTS
5860 .equal
5870  LDA Rinp
5880  CMP Rout
5890  BNE equal2
5900  LDA tinp+1
5910  CMP tout+1
5920  BNE equal2
5930  LDA tinp
5940  CMP tout
5950  BNE equal2
5960 .equal2
5970  RTS
5980 .read
5990  LDY Rout
6000  LDA Rtab,Y
6010  TAY
6020  CLC
6030  JSR tran
6040  RTS
6050 .subout
6060  LDA Rout
6070  SEC
6080  SBC Rinp
6090  BEQ subout2
6100  JSR size
6110 .subout2
6120  TXA
6130  CLC
6140  ADC tinp
6150  TAX
6160  TYA
6170  ADC tinp+1
6180  TAY
6190  TXA
6200  SEC
6210  SBC tout
6220  TAX
6230  TYA
6240  SBC tout+1
6250  TAY
6260  RTS
6270 .subinp
6280  LDA Rmax
6290  CLC
6300  ADC Rinp
6310  SEC
6320  SBC Rout
6330  BEQ subinp2
6340  JSR size
6350 .subinp2
6360  TYA
6370  CLC
6380  ADC #&40
6390  TAY
6400  TXA
6410  CLC
6420  ADC tinp
6430  TAX
6440  TYA
6450  ADC tinp+1
6460  TAY
6470  TXA
6480  SEC
6490  SBC tout
6500  TAX
6510  TYA
6520  SBC tout+1
6530  TAY
6540  RTS
6550 .size
6560  LDX #&06
6570 .size2
6580  ASL A
6590  BCS size3
6600  DEX
6610  BNE size2
6620  TAY
6630  RTS
6640 .size3
6650  LDX #&FF
6660  LDY #&FF
6670  RTS
6680 .block
6690  LDX Rnum
6700  STY Rnum
6710  STY romsel
6720  BCC getchar
6730  STA tinp
6740  BCS return
6750 .getchar
6760  LDA tout
6770 .return
6780  STX Rnum
6790  STX romsel
6800  RTS
6810 .blockend
6820 ]
6830 NEXT
6840 *KEY8OSCLI"SAV
E Buff "+STR$~HIMEM+
" "+STR$~O%+" 8000 8
000"|M
6850 *KEY9OSCLI"SRW
RITE "+STR$~HIMEM+"
"+STR$~O%+" 8000 4"|
M
6860 PRINT''"Progra
m assembled &";~P%-&
8000" bytes"''"f8 to
 save to disc"''"f9 t
o load into ram"
```

This listing is included in this month's tape & disc offer. See order form on Page 151.

Get it right!

```
100 =    0 0
110 =    0 0
120 =    0 0
130 = 2418 8
140 = C001 7
150 = B1C5 9
160 = D26C C
170 = 719B F
180 =  BDF 0
190 = 2260 C
200 = F6A0 6
210 = A0B6 9
220 = 48F8 2
230 = BC86 A
240 = 5532 8
250 = 74B9 0
260 = FB31 C
270 = F814 F
280 = AA42 B
290 = FE7F E
300 =   78 A
310 = 7966 6
320 = AF9E 6
330 = 989A F
340 = 7F8A B
350 = 5EB9 0
360 = 89DC 5
370 = 4763 6
380 = 3648 0
390 = E996 4
400 = 1207 8
410 = 83AA 6
420 = B9CA 9
430 = 9FCE 6
440 = 6132 D
450 = 339E F
460 = B1F1 F
470 = 1757 4
480 = 2782 0
490 = E106 9
500 = 3208 6
510 = 4D13 3
520 = 8B24 B
530 = 13E3 4
540 = 424D 0
550 = 9A4A 4
560 = FD02 2
570 = 18A5 E
580 = 55AF 6
590 = E2BF A
600 = 9715 8
610 = E2BF B
620 = E93C F
630 = D238 E
640 = 140A 6
650 = 7FC5 7
660 = 4398 5
670 = 60BD 7
680 = 8E7E D
690 = 5DFD D
700 = 140A 0
710 = FB97 D
720 = 2651 B
730 = F1E5 C
740 = 805E 1
750 = D5F2 5
760 = 6E12 1
770 = 99B9 1
780 = 45D3 F
790 = F97F 1
800 = C94D 5
810 = D93D 3
820 = D386 8
830 = 28D2 9
840 = 7CE7 7
850 = AF7E E
860 = A8FB B
870 = E188 8
880 =  330 D
890 = DCB1 E
900 = 3885 B
910 = 9843 4
920 = 5D7E 4
930 = DCB1 C
 940 = 3647 4
 950 = 68AF D
 960 = 7103 2
 970 = 58DE 0
 980 = 3334 D
 990 = A9E1 5
1000 = 6272 2
1010 = DCB1 F
1020 = 777B 5
1030 = A79E 8
1040 = 68AF 9
1050 = 5B46 0
1060 = 54D7 9
1070 = E442 C
1080 = 2651 4
1090 = 3334 1
1100 = 251D 1
1110 = BB8F 6
1120 = 9F71 9
1130 = 5E2B 3
1140 = 9224 2
1150 = 7602 1
1160 = 6E18 9
1170 = ABAE 5
1180 = 3334 F
1190 = 251D F
```

The Atari 520 ST gives you the power to defeat deadly enemies, slaughter monsters and outwit cruel captors.

LEVEL 9
FREE PLAY = 2000 HEALTH
©1985 ATARI GAMES
ATARI

Gauntlet – U.S. Gold. Enter a world of monsters, mazes, mystery and combat in the ultimate role-playing fantasy game.

Tai Pan – Ocean. Voyage to 19th Century Hong Kong for action and excitement with pirates, smuggling and mutiny.

HIGH SCORE
50000
ROUND 2
TIME
AREA
ATARI

Metrocross – U.S. Gold.* It takes lightning reflexes to get past the potholes, obstacles and forbidden zones to reach the other side. And that's just the beginning!

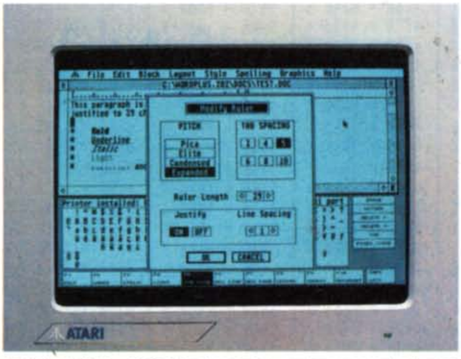
Arkanoid – Imagine.* The latest smash-hit coin-op game! Are your reactions quick enough to handle 33 different play screens?

Desk
Options
Scores
STARRAIDERS
ATARI

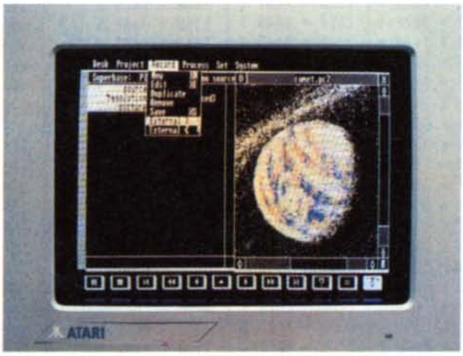
Star Raiders – Atari. Star Raiders are the only force strong enough to hold off the Zycroids. Your task is to command the Starcruiser – are you up to it?

Flight Simulator II – Sublogic. Take the controls of a Cessna 182 or Learjet 25G. With high speed 3D graphics for take-offs, landings and acrobatics, it's just like the real thing!

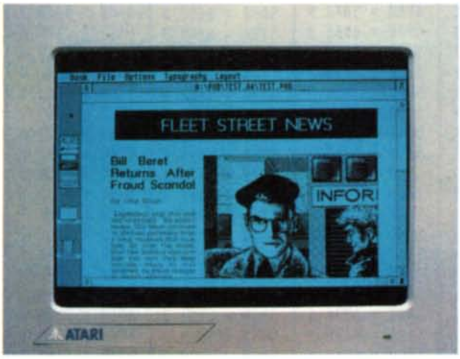
But it's not all fun and games.


File Edit Block Layout Style Spelling Graphics Help
PITCH
Pica
Elite
Condensed
Expanded
Ruler Length
Justify
Line Spacing
ATARI

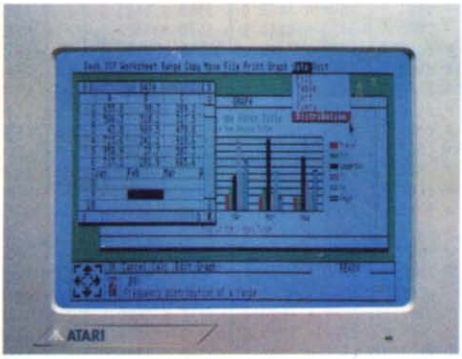
1st Word Plus – G.S.T. Professional word processor featuring U.K. spellings and integration of graphics including 1st Mail for full control of form letters etc.


Desk Project Process Set System
Edit
Duplicate
Remove
Save
ATARI

Superbase Personal – Precision Software. All the features of GEM combined with full relational database power. Easy to set up, flexible, plus unique picture index facility.


Desk File Options Typography Layout
FLEET STREET NEWS
Bill Beret Returns After Fraud Scandal
INFOR
ATARI

Fleet Street Publisher – Mirrorsoft. The complete desk-top publishing package. Gives you page make-up combining text and graphics for sophisticated, professional looking documents.



VIP GEM – Silica Distribution. VIP Professional is an integrated spreadsheet, database, and graphics package. GEM environment plus Lotus 1-2-3 compatibility.

Mixing business with pleasure is no problem with an Atari 520 ST. Not when you've got over 1,000 software titles to choose from.

You'll find all the latest games and a huge range of business titles from the top business software houses. And the range is growing all the time.

You won't be short of power, either. The Atari 520 ST is twice as powerful as most business micros.

So you'll be able to create spectacular colour graphics. Even animate them to make your own films.

If you're musically minded, you can compose and play a full symphony.

Or, for those who'd rather write programs than music, the 520 ST supports over thirty programming languages.

In fact, whatever you're looking for in a computer, you'll find it in the Atari 520 ST.

ATARI 520 ST

WORKS HARD · PLAYS HARD

*Screenshots are from the original Arcade game. If you require any further information concerning software featured please write to: PO Box 555, Atari House, Railway Terrace, Slough, Berks SL2 5BZ

Get it right!

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```
1200 = DB49 9
1210 = 362F 9
1220 = 1EFF E
1230 = 3334 5
1240 = A9E1 5
1250 = CB68 8
1260 = 9224 C
1270 = 7602 2
1280 =  EDE A
1290 = E454 A
1300 = 353C 3
1310 = 904A 8
1320 = 7602 0
1330 = 362F 3
1340 = 9602 8
1350 = E081 3
1360 = 54D7 4
1370 = 6623 A
1380 = B50D 0
1390 = E081 6
1400 = 9602 6
1410 = 62D4 5
1420 = BD53 3
1430 = 2651 3
1440 = 69A6 1
1450 = BE49 3
1460 = 8E7E 7
1470 = 5DFD 9
1480 = 856E 9
1490 = 62B5 7
1500 = 4B2E 9
1510 = 8260 E
1520 = F46C 6
1530 = A955 A
1540 = A98A 7
1550 = 6E12 6
1560 = CE23 7
1570 = 251D 4
1580 = DC13 A
1590 = 8E7E 3
1600 = 5DFD 4
1610 = F6AE 2
1620 = 52A2 A
1630 =  330 C
1640 = 54D7 A
1650 = E442 2
1660 = 4DB1 A
1670 = 9602 3
1680 = C87B 6
1690 = C9F3 D
1700 = AE46 7
1710 = E4EA 6
1720 = FB97 E
1730 = 33F5 B
1740 = 770B 1
1750 = 9911 9
1760 = 2666 8
1770 = A94F 6
1780 = C3BD 8
1790 = 8EEE 4
1800 = 757E 2
1810 = 824E 9
1820 = 949B 7
1830 = 824E 2
1840 = 9EE3 5
1850 = 8857 7
1860 = BA6C 5
1870 = E687 B
1880 = E8A9 F
```

```
1890 = 5DC0 3
1900 = 22A5 B
1910 = DC13 7
1920 = 8E7E 5
1930 = F415 E
1940 = 262C 9
1950 = 8311 3
1960 = 89A9 3
1970 = D488 D
1980 = F925 D
1990 = FED2 5
2000 = 350D 6
2010 = 21F0 0
2020 = 538C A
2030 = B8AA 2
2040 = F888 B
2050 = 94B8 9
2060 = 2EB0 D
2070 = C801 B
2080 = 8D00 2
2090 = 2D46 9
2100 = 74FB 2
2110 = 2D46 7
2120 = DA51 7
2130 = C801 9
2140 = CBD5 C
2150 = 8D00 9
2160 = 2D46 2
2170 = 74FB D
2180 = 2D46 6
2190 = 66FF 2
2200 = C801 E
2210 =  8C2 F
2220 = 6ECC 2
2230 = 3531 C
2240 = 6A14 2
2250 = C801 D
2260 = DB31 E
2270 = 4E8A 2
2280 =  542 2
2290 = 4E8A B
2300 = A673 0
2310 = 775F 8
2320 = 5FC5 D
2330 =  8A9 B
2340 = 7EA5 3
2350 = A955 C
2360 = 29F7 A
2370 = FB97 4
2380 = 7103 5
2390 = B97C B
2400 = 58DE C
2410 = DC83 E
2420 =  330 5
2430 = DCB1 4
2440 = 4E8A 7
2450 = 777B 5
2460 = 4C9A E
2470 = 9843 D
2480 = 80B9 7
2490 = 9911 D
2500 = 2666 3
2510 = 1E3A 1
2520 = 4F36 E
2530 = 1E6A C
2540 = 1612 7
2550 = 3B5E 6
2560 = A955 1
2570 = CBFD 3
2580 = 75B8 E
2590 = 2C4A 9
```

```
2600 = FB9E E
2610 =  51A C
2620 = F287 D
2630 = E8A9 F
2640 = A660 E
2650 = 7602 4
2660 = D920 4
2670 = EBBF F
2680 = 58DE 6
2690 = 33F5 A
2700 = 391B 9
2710 = BEF2 F
2720 = 93BE 5
2730 = AD7B 2
2740 = DCB1 3
2750 = 3647 B
2760 = 86F3 7
2770 = 28C8 7
2780 = 40B3 0
2790 = AD7B 4
2800 = 5FEE C
2810 = 8A2B E
2820 = B706 2
2830 =  436 B
2840 = AD7B B
2850 = 5AA4 0
2860 = 74FB 6
2870 = D6D7 2
2880 = 9224 A
2890 = AA6B C
2900 = 9C1B 2
2910 = 4210 F
2920 = 5AA4 5
2930 = C45F 1
2940 = E9F2 B
2950 = 777B 0
2960 = F925 6
2970 = D488 D
2980 = A19A 2
2990 = FED2 0
3000 = 21F0 B
3010 = 350D A
3020 = 675A D
3030 = 9C3B 8
3050 = 9843 2
3060 = 34F9 3
3070 = 757E 5
3080 = 824E 3
3090 = 949B 6
3100 = 824E E
3110 = 251D 9
3120 = DC13 9
3130 = CD1B 5
3140 = 8E7E 5
3150 = F415 8
3160 = 262C 5
3170 = 6A2F F
3180 = 1A09 8
3190 = 74FB 6
3200 =  16A B
3210 = 772F E
3220 = 824E 7
3230 = 251D 1
3240 = 134E B
3250 = F6FD F
3260 = 5F3E C
3270 = 635E E
3280 = 94C3 8
3290 = 7602 A
3300 = 6623 6
3310 = F6FD 4
```

```
3320 = 5F3E E
3330 = 635E 6
3340 = 94C3 B
3350 = 7602 8
3360 = 6623 E
3370 = 8ED7 1
3380 = 5F3E 9
3390 = 6623 2
3400 = 6AA4 A
3410 = C6D9 D
3420 =  330 D
3430 = 4E8A D
3440 =  542 D
3450 = 4E8A F
3460 = A673 8
3470 = 2C4A D
3480 = 251D A
3490 =  36F 8
3500 = 6ECC E
3510 = F287 9
3520 = 4F42 5
3530 = 586D 3
3540 = 6623 A
3550 = 6623 8
3560 = 6623 2
3570 = 7602 4
3580 = 7602 5
3590 = 6AA4 9
3600 = D6F8 F
3610 = B8E5 5
3620 = 9911 A
3630 = 5DFD 2
3640 = B7BF C
3650 = 9843 9
3660 = 14FC 4
3670 = A673 6
3680 = 262C 3
3690 = 60BD 2
3700 = B8A4 2
3710 = 2EB0 5
3720 = 923F 7
3730 = 9224 E
3740 = 6623 6
3750 = B47C 7
3760 = A885 3
3770 = 9843 F
3780 = D394 2
3790 = A673 1
3800 = 262C 4
3810 = 60BD 4
3820 = 2035 8
3830 = 9C7E B
3840 = F888 C
3850 = 790F 8
3860 = 6623 B
3870 = 2EB0 B
3880 = CD05 5
3890 = 75D7 8
3900 = 10DD 9
3910 = B1B2 7
3920 = CC0B 4
3930 = E2BF 7
3940 = A24A 7
3950 = 4350 D
3960 = E2BF F
3970 = CD11 E
3980 = 4E18 B
3990 = E2BF B
4000 = 4B7D 8
4010 = A260 7
4020 = E2BF A
```

Get it right!

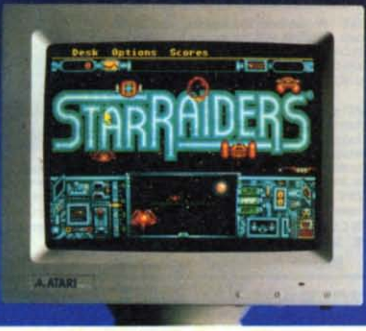
```
4030 =  BBB 3
4040 = ADC1 5
4050 = E2BF 7
4060 = 8FA2 8
4070 = 29AB 4
4080 = E2BF 6
4090 = 52B4 0
4100 = 31B9 9
4110 = E2BF 2
4120 = EB19 3
4130 = 65E7 7
4140 = E0D6 5
4150 = 4D93 1
4160 = 64EA A
4170 = 805E 5
4180 = 2C4A 0
4190 = 3A01 0
4200 = FD2A 6
4210 = 4C9A 7
4220 = 6E13 2
4230 = D033 C
4240 = 824E 2
4250 = 2730 5
4260 = 2BB2 8
4270 = 6E12 C
4280 = 20F1 3
4290 = ED0B 9
4300 =  330 F
4310 = 1311 D
4320 = 4E8A A
4330 = 4C9A F
4340 = 8D00 3
4350 = 9843 3
4360 = C012 0
4370 =   94 4
4380 = B4C9 0
4390 = 772F 0
4400 = A65B 2
4410 = 8D00 A
4420 = 2D46 4
4430 = 3735 6
4440 = A979 5
4450 =  69A 1
4460 = A4D4 B
4470 = 875B 1
4480 = A979 0
4490 = FED2 E
4500 = 350D D
4510 = 3AA9 0
4520 = C6C7 E
4530 = 5AA4 D
4540 = C45F 4
4550 = B0F5 4
4560 = A4AF 6
4570 = B958 3
4580 = D45E 7
4590 = A0D4 1
4600 = 777B 3
4610 = 9C3B 0
4620 =  330 8
4630 = 1311 7
4640 = 4E8A B
4650 = 4C9A 3
4660 = 74FB B
4670 = 9843 1
4680 = E1DB B
4690 = 805E 9
4700 = 2C4A 9
4710 = 3A01 E
4720 =  D07 7
4730 = 4C9A 6
```

```
4740 = BB26 1
4750 = 201E 5
4760 = 824E 5
4770 = 4F36 4
4780 = 1D26 F
4790 = 4E8A 1
4800 = 4C9A B
4810 = 8D00 C
4820 = 9843 D
4830 = 303F 1
4840 = 2BB2 F
4850 = 6E12 1
4860 = CD20 A
4870 = 6D66 1
4880 = 40D8 4
4890 = 772F 9
4900 = 4E8A F
4910 = 4E8A D
4920 = 670E 7
4930 = 4E8A D
4940 = 6ECC 4
4950 = 4C9A E
4960 = 74FB 7
4970 = 9843 C
4980 = 50F9 9
4990 = 6D66 B
5000 = 824E 6
5010 = 1A98 2
5020 = 7916 3
5030 = 1267 1
5040 = B029 C
5050 = 875B 2
5060 = 7916 C
5070 = FED2 2
5080 = 21F0 8
5090 = 1704 0
5100 = 16A8 2
5110 = 5AA4 6
5120 = E9F2 9
5130 = 609A D
5140 = A4AF D
5150 = 6937 0
5160 = E9FF A
5170 = 70BB 6
5180 = 777B 3
5190 = A19A 0
5200 = 4E8A F
5210 = 74FB 1
5220 = 8BE7 0
5230 = EA57 9
5240 = 805E C
5250 = 3A01 6
5260 = B880 8
5270 = 4C9A 2
5280 = 805E F
5290 = EB67 2
5300 = 8521 C
5310 = 251D D
5320 = DC13 2
5330 = 8E7E A
5340 = 5DFD 2
5350 = B880 C
5360 = FB97 6
5370 = 4C9A 2
5380 = 9843 0
5390 = A10C 0
5400 = 4C9A F
5410 = 53EB 0
5420 = 1D75 9
5430 = 251D 1
5440 = 60BD F
```

```
5450 = 7297 0
5460 = 5129 C
5470 = 8D00 3
5480 =  785 3
5490 = E43B D
5500 = A4D4 1
5510 = A720 4
5520 = 3AFF 3
5530 = D941 B
5540 = DF74 A
5550 = 927E B
5560 = 74FB 4
5570 = AF93 4
5580 =  D54 D
5590 = BFD3 8
5600 = 7DB3 E
5610 = 7556 3
5620 = 4642 3
5630 =  8C2 5
5640 = 7602 E
5650 = 5DFD F
5660 = A11B 3
5670 = 4F36 C
5680 = 5129 5
5690 = B6CC 8
5700 = 614A 3
5710 = F36C B
5720 = 614A 2
5730 = 7602 6
5740 = 6623 6
5750 = 6D92 B
5760 = 5DFD B
5770 = 8D00 C
5780 = 3A2E 4
5790 = 670E 9
5800 = 6ECC C
5810 = 4C9A 3
5820 = 772F A
5830 = 5DF1 5
5840 = 4C9A 5
5850 = 9843 6
5860 = 1D28 7
5870 = 1752 7
5880 = 97D5 6
5890 = F155 E
5900 = A4D4 A
5910 = 5E23 E
5920 = F155 6
5930 =  785 D
5940 = 8702 3
5950 = F155 3
5960 = FD8D 5
5970 = 9843 7
5980 =  CA3 6
5990 = 2D39 F
6000 = B4C9 6
6010 = 772F 8
6020 = 74FB 1
6030 = 2D46 3
6040 = 9843 0
6050 = 238C 5
6060 = 3AFF 0
6070 = 8D00 9
6080 = D941 F
6090 = A309 0
6100 = A11B 5
6110 = 8E10 0
6120 = 5DFD B
6130 = 74FB C
6140 = DAA1 E
6150 = 670E 7
```

```
6160 = 6ECC B
6170 = A349 F
6180 = 772F 1
6190 = 5DFD 7
6200 = 8D00 8
6210 = E43B 8
6220 = 670E 6
6230 = 6ECC 6
6240 = A720 1
6250 = 772F 4
6260 = 9843 5
6270 =  E21 1
6280 = 5AA4 1
6290 = 74FB C
6300 = CA76 1
6310 = 8D00 5
6320 = F4EC E
6330 = FBC6 6
6340 = A11B F
6350 = D6DF 2
6360 = 6ECC 5
6370 = 74FB 6
6380 = 669B E
6390 = 772F E
6400 = 5DFD E
6410 = 74FB 0
6420 = DAA1 6
6430 = 670E 6
6440 = 6ECC 0
6450 = A349 0
6460 = 772F B
6470 = 5DFD 9
6480 = 8D00 3
6490 = E43B 8
6500 = 670E 2
6510 = 6ECC 2
6520 = A720 F
6530 = 772F 4
6540 = 9843 4
6550 = C0DE 0
6560 = 45DB 2
6570 = 115D 7
6580 = 6311 4
6590 = 14D1 D
6600 = E8A9 B
6610 = C4CA 8
6620 = 772F C
6630 = 9843 8
6640 =  17C 7
6650 = 99B3 D
6660 = DC13 8
6670 = 9843 3
6680 = CAFA C
6690 = DCB1 6
6700 = 4A1C D
6710 = 3110 9
6720 = 9A8B 3
6730 = D488 9
6740 = 1F92 B
6750 = 51B4 D
6760 = 2A28 3
6770 = F006 0
6780 =  FBC 0
6790 = 76C3 0
6800 = 9843 F
6810 = 69A0 6
6820 = 8B58 B
6830 = 2C83 0
6840 = 2A28 0
6850 = 80AF 9
6860 = 5857 9
```

To help you destroy the aliens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MARCH 1987: Dino, ride the gobbiosaurus in this prehistoric romp. Birthday Mystery, discover the implement of a serious crime. Half-Life, a radio-active random decay simulation. Compressor II, create multi-statement lines. Teletext Carousel, a utility for the Morley Teletext Adapter. Hac Man, the Jet Set Willy II Upgrade. Command Clashes, rom problem solved. Body Building, software for temperature measurement. 6502 Games, collision detection demonstration. Library, three useful routines.

APRIL 1987: Hunkie Egg, collect the eggs in our fast action Easter game. Biomorphs, create creatures with this fascinating simulation. Disc Protection, a utility to stop piracy disc. Counting, the program for the DIY keyboard. 6502 Games, make your sprites follow the leader. *Plus four more routines from the Library.*

MAY 1987: Ducks Dinner, help Daffy Duck get his dinner and avoid the poison skulls. Ludo, an excellent implementation of the popular family game. Interactive Programs, incorporate the wealth of teletext into your programs. Disc Cataloguer, find misplaced files fast. Sid and the Beetle, a simple teaching aid for logical thinking. 6502 Games, programs to get sprites moving in a window. *Plus four more routines from the Library.*

JUNE 1987: Prof McBrolly, pit your wits against the goblins in this race against time. Checksums, type in listings in confidence. Raglan, design your own patterns to any size. Prommer, run your own programs from rom. Button, double the firepower of your Compact. Cansim, a Canadian agricultural simulation. Body Building, the software to drive your video digitiser. *Plus four more routines from the Library.*

JULY 1987: Diamond Quest, dodge boulders to collect the jewels. Espionage, infiltrate an enemy base. Printer Buffer, work while you print. Super Line Editor, powerful Basic line editor. Encrypt, a disc-based utility. Basic Repair, cancel those Bad program errors. Basdat, bytes to Basic – a unique data creation program. Logo-Tank, train your imagination and visual memory. Computers in Action, verify your payslip. *Reply, add new star commands. *Plus more routines from the Library.*

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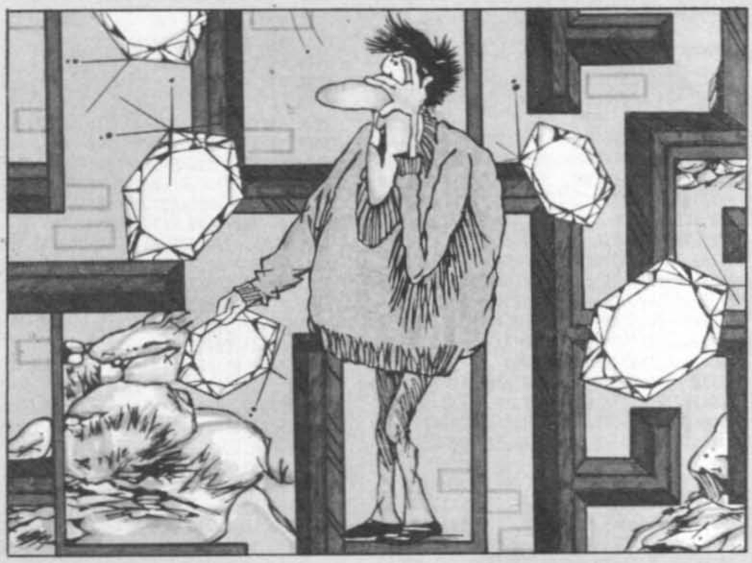
TO ORDER TURN TO THE FORM ON PAGE 151

◀ *From Page 21*



```
   10 REM Diamond Quest
   20 REM By J.S.Bee
   30 REM (c) The Micro User
   40 MODE7
   50 IF PAGE=&3000 THEN810
   60 *FX15
   70 *K.0FORI%=TOP-PAGE TO -4 STEP-4:I%
!&3000=I%!PAGE:N.|MPAGE=&3000|M|FO.|MRUN
|M
   80 VDU21:*FX138,0,128
   90 END
  100 MODE2
  110 *FX9,2
  120 *FX10,2
  130 HIMEM=&2600
  140 DIM S%(5),N$(5),L%(6),A%(6)
  150 RESTORE 160:FOR I%=1 TO 5:READ A%(
I%),L%(I%):NEXT
  160 DATA&900,&123,&2600,&15D,&275D,&14
D,&28AA,&166,&2A10,&EA
  170 scrsp=&1778:title=&15ED:scri=&134A
:scroll=&1523:start1=&1114:speed=&82
  180 score=&171E:dhite=&14A3:start=&110
0:char=&1748:coff=&1661:flip=&16C3:lives
=&173D
  190 FORI%=0TO5:N$(I%)="Micro User":S%(
I%)=(6-I%)*10:NEXT
  200 PROCsi
  210 CALLtitle:PROCdhs(7,6,6,"Keys")
  220 COLOUR5:PRINT'''SPC4"Z - Left"''S
PC4"X - Right"''SPC4": - Up"''SPC4"/ - D
own"''SPC4"P - Pause"''SPC4"R - Resume"
'SPC4"D - Quit/Die"''SPC4"S - Sound On"
'SPC4"Q - Sound Off"
  230 I%=TIME:REPEAT:CALLscroll:G$=INKEY
$(0):UNTIL G$=" " OR TIME>I%+700
  240 IF G$=" " THEN290
  250 PROCdis
  260 I%=TIME:REPEAT:CALLscroll:G$=INKEY
$(0):UNTIL G$=" " OR TIME>I%+700
  270 IF G$=" " THEN290
  280 GOTO210
  290 L%=1
  300 PROClevel(L%)
  310 CALLstart
  320 IF ?lives=48 THEN 360
  330 *FX21
  340 IF L%=5 PROCcomp:CALLstart1:GOTO32
0
  350 IF ?&7F=0 L%=L%+1:PROClevel(L%):CA
LLstart1:GOTO320
  360 MODE2:HIMEM=&2B90:PROChi
  370 PROCsi:I%=TIME:REPEAT:CALLscroll:G
$=INKEY$(0):UNTIL G$=" " OR TIME>I%+700
  380 IF G$=" " THEN 290
  390 GOTO210
  400 END
  410 DEF PROCcomp:L%=1:?speed=?speed-2:
CALLflip:VDU22,2
  420 CALLcoff:PROCdhs(5,5,7,"Well Done!
"):PROCdhs(0,11,3,"All Screens Complete"
):PROCdhs(2,17,6,"Now try it again!")
  430 I%=TIME:REPEAT:UNTIL TIME>I%+400
  440 PROClevel(L%):ENDPROC
  450 DEF PROCsi:A$="Press the Space bar
 to start   ":$scrsp=A$:CALLscri:ENDPROC
  460 DEF PROClevel(L%):CALLflip:PROCdhs
(6,11,7,"Screen "+STR$L%):PROCexpand:END
PROC
  470
  480 DEF PROCinput
  490 CALLtitle:PROCdhs(2,7,6,"You are i
n the"):PROCdhs(1,10,6,"High Score table
!")
  500 PROCdhs(2,16,5,"Enter Your Name"):
PROCdhs(4,21,132,STRING$(12," ")):PROCdh
s(4,23,132,STRING$(12," "))
  510 N$="":PRINTTAB(5,23);
  520 REPEAT:VDU23,1,1;0;0;0;:K%=GET
  530 VDU7
  540 IF K%=127 N$=LEFT$(N$,LENN$-1):GOT
O570
  550 IF K%=13 THEN580
  560 IF LENN$<10 N$=N$+CHR$K%
  570 CALLcoff:PROCdhs(5,22,7,N$+" "):VD
U8,10
  580 UNTIL K%=13:COLOUR128:CALLflip:CAL
Lcoff:ENDPROC
  590
  600 DEF PROChi:S%=VAL($score):*FX21
  610 IFS%<S%(5) THEN640
  620 FORI%=0TO5:IFS%<S%(I%) NEXT ELSE F
ORJ%=5TOI%+1STEP-1:S%(J%)=S%(J%-1):N$(J%
)=N$(J%-1):NEXT:S%(I%)=S%:N$(I%)="":P%=I
%:S%=0:I%=5:NEXT
  630 PROCinput:N$(P%)=N$
  640 PROCdis:ENDPROC
  650
  660 DEF PROCdis:CALLtitle:PROCdhs(6,6,
6,"Top Six"):FORJ%=0TO5:PROCdhs(2,10+J%*
3,5,N$(J%)+STRING$(14-LENN$(J%),".")):PR
OCdhs(16,10+J%*3,7,STR$S%(J%)):NEXT:ENDP
ROC
  670
  680 DEF PROCdhs(E%,F%,G%,M$):COLOURG%:
PRINTTAB(E%,F%);:FOR I%=1 TO LENM$:?char
=ASC(MID$(M$,I%,1)):CALLdhite:NEXT:ENDPR
OC
  690
  700 DEF PROCexpand
  710 A%=&2BF6:?&7F=0:B%=1:D%=A%(L%):C%=
L%(L%)
  720 FOR J%=D% TO D%+C%-1
  730 N%=?J%/8:FOR I%=1 TO N%:?A%=?J% AN
D 7
  740 IF ?A%=3 ?&7F=?&7F+1
  750 A%=A%+1:B%=B%+1:IF B%=28 B%=1:A%=A
%+6
  760 NEXT,
  770 H%=&2B90+(RND(27)+4)*33+(RND(27)+4
):IF ?H%<>0 THEN770
  780 ?H%=6
  790 ENDPROC
  800
  810 FOR I%=&2B90 TO &2FF0 STEP 4:!I%=&
02020202:NEXT
  820 ENVELOPE1,130,3,0,0,30,0,0,24,0,-2
,-2,120,120
  830 VDU23,224,0,0,8,28,28,8,0,0,23,225
,73,34,8,93,93,8,34,73
  840 *FX213,250
  850 *FX214,1
  860 *FX4,2
  870 *FX229,1
  880 PRINT''"Please wait a short while"
;
  890 PROCread(&1800,1100,"SPRITES")
  900 PROCread(&0900,1150,"SCREEN 1")
  910 PROCread(&2600,1210,"SCREEN 2")
  920 PROCread(&275D,1270,"SCREEN 3")
  930 PROCread(&28AA,1330,"SCREEN 4")
  940 PROCread(&2A10,1390,"SCREEN 5")
  950 PROCread(&1100,1440,"CODE")
  960 *FX15
  970 *K.0 DELETE 810,2000|MDELETE 40,90
|MFORI%=0TO TOP-PAGE STEP4:I%!&1900=I%!P
AGE:N.|MPAGE=&1900|M|FO.|MRUN|M
  980 VDU21:*FX138,0,128
  990 END
 1000 DEFPROCread(M%,O%,B$)
 1010 RESTORE O%:READ Q%:R%=0
 1020 FORJ%=1 TO Q%:READ C$
 1030 !M%=EVAL("&"+C$)
 1040 FORI%=0TO3:R%=R%+I%?M%:NEXT
 1050 M%=M%+4:NEXT
 1060 READ C$:T%=EVAL("&"+C$)
 1070 IF T%=R% PRINT"."; ELSE PRINT''CHR
$129;"Error found in ";B$;" data!":END
```

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```
 1080 ENDPROC
 1090 REM SPRITES
 1100 DATA 64
 1110 DATA 00000000,00000000,00000000,00
000000,00000000,00000000,00000000,000000
00,0F030303,0F030303,0F0B0B0B,0F030303,0
F030303,0F030303,0F030303,0F0B0B0B,00000
400,00000800,04000000,08000000,00000400,
00080000,00000000,04000008
 1120 DATA 05000000,00000005,230B0F05,05
0F0B23,270A0A00,000A0A27,00000000,000000
00,00000000,04000011,30105555,082A1510,3
020AAAA,04152A20,00000000,08000022,13030
100,00010113,33311203,03121131,31322103,
03212233,13032200,00020213
 1130 DATA 30343430,30303030,34343C30,30
3C3434,38383C30,303C3838,30383830,303030
30,0F0F0F30,33333330,0F0F0F30,24242430,1
A1A1A30,0C0C0C30,03030330,0C0C0C30,11EC
 1140 REM SCREEN 1
 1150 DATA 73
 1160 DATA 100B1AE1,600D2A09,09181A11,0D
0A190D,080B3009,181A111A,08211B09,2F0B10
0B,0910110A,09130928,27100A08,11170A10,1
8090B08,10210809,0B38170A,18091211,0B090
B09,0B180F28,11100B10,19180912,0B081728,
281A2920,180F2809,100D1009
 1170 DATA 080B1019,080A0B0A,080F1021,1A
09080B,20190809,091B081A,11200B08,111309
12,0908A10B,0B301113,0819101D,2908111D,1
50B2108,08090D0B,23090D09,10111220,092B0
912,1B100A10,120F0B17,47690A21,2208110A,
080F0B09,200A0B0A,200A0B0A
 1180 DATA 08110B0F,08090819,201A080F,11
17201A,0F080B08,0F0811A8,1F080F08,113039
20,0B100F0B,09300F10,09080913,284F1128,3
0111009,0D0F2811,09180F0A,0910090B,11280
908,120B0F2B,11180920,0B1D1130,0F100F0D,
102B1180,11800F0A,0A270817
 1190 DATA 00E1800F,19C4
 1200 REM SCREEN 2
 1210 DATA 88
 1220 DATA 200D2AE1,0D0F0D57,1F110D0F,0F
0B0F0A,0F3D0F18,0B081B0D,0A082A11,1B080D
10,13081B0D,080B080F,0A1F0A11,4D1F0A08,1
10B0827,20120D0A,0F4D0F0D,111F080B,0B0F0
B0F,13080B08,25174D0F,0A080F11,117B0F30,
080B080F,080B080B,0A480A0B
 1230 DATA 080B100F,0A180D11,12080A08,0A
200B20,1311200F,0F201B58,11080B10,0B580B
10,11200F28,0F080F10,0F080F08,0F201B20,1
1080B10,0B0F080B,0B0F0B0F,280B280F,10112
00F,100F583F,1811080B,0F0D0F1D,0B080B10,
0B080B08,11200F10,0823080B
 1240 DATA 09580A0B,11080B10,0B180A40,0B
080D08,11200918,0A080B30,0D0B0918,091809
0B,11080B10,100B200B,0809180A,1809080D,0
80D1009,080B2011,18090809,18091B09,111B0
809,09100B18,09180908,0918091B,110B0813,
091D0B10,09180908,19180918
 1250 DATA 100B1908,090B091B,1B091308,08
1A1809,18090821,08090B09,0D090D29,210819
10,09180908,4308090B,0B0A0809,0B210809,0
B091B09,08092B19,0B19080A,000000E9,1A80
 1260 REM SCREEN 3
 1270 DATA 84
 1280 DATA 200D30E1,280D280D,15110C09,0A
10090A,411A3B10,090A091D,182B180D,112B09
0D,0A090B12,1B180D11,35090D18,0A090D21,0
D090B09,0D180B18,10113D09,0913091A,090D2
80D,08112D1A,1B110D11,0D180D09,1D122009,
231A1011,0D080D11,0A300B09
 1290 DATA 21081115,0913091B,1240110A,25
090811,09180F0A,50090D0A,0B090811,0D080D
12,090D2209,09081150,291A2108,0811480D,4
80A1809,08114013,0A600A21,0A0D0A0D,2F201
110,0D102F08,0D0A0D08,11080D0A,0F10090B,
220F120B,0F100F0D,0F080F08
 1300 DATA 21080F08,0F0A0F10,0D0B270A,0B
0F100F,1B0F0B0F,0A0F2011,0F0B320F,0F2051
10,2F0A0F0A,12300F0A,18110D0B,0A0F0A17,0
B0D0B0F,300F0A0F,0B080A0F,120F1811,0A0F0
A0F,0A0F080D,0D0F300F,1811080A,0A170A0F,
0A1F0D0F,0B0F300F,20110D08
 1310 DATA 0B0A0F0A,0F300F32,110B0A08,21
086718,080A0F08,0A18110A,1D09085D,080D0F
0A,5B20110D,0B0A0B11,0F0B1708,0B2108E1,1
B3E
 1320 REM SCREEN 4
 1330 DATA 90
 1340 DATA 0D0972E1,72114209,12090D09,0D
090D09,72110A09,120B0D0B,0B080B09,0B610B
08,100B1011,101B090A,12114B11,0B080B09,0
D091819,110D4B11,181A1812,13110D09,0D091
327,180A110B,0D092012,080F2311,1D080B0F,
080A1811,0D0B180D,13172311
 1350 DATA 30130D09,100D0B0D,13110D0B,08
0F0B0F,11230D0F,080B0D18,0B100D0B,131F1B
11,10111509,080B0D0B,0D0B080B,4311080B,0
A110D09,0D0B100F,0D080B08,4311100B,100F1
A19,0D080D0B,2261180B,0B0D0B20,150B1120,
0D0B0D08,1A090D08,11280B30
 1360 DATA 0B0D1308,0B0D0B08,0A381209,10
110A20,08090D09,1A110D09,12101A28,0D0910
11,0D090809,22182211,10111A08,08090D09,1
908091B,29082118,0915080D,0D081218,09080
913,080B0D13,0D0B111D,130A201B,11081108,
19230813,0D0B0815,0D19200B
 1370 DATA 080B1113,0D191513,180B1009,0D
110B09,0D0B080B,13100B11,08090D19,080918
09,0D2B0D11,11180B11,0B100913,11080D08,0
B0D130D,110D130D,0A101118,150B0910,09530
D09,0000E11B,1AAE
 1380 REM SCREEN 5
 1390 DATA 59
 1400 DATA 180D18E1,7509100B,201A0D21,15
117509,09300D09,282D1175,0B0A0B1A,0B0A0B
0A,0B0A0B0A,1523110A,11700920,09200A2B,0
D11680B,0B11301A,0B110B58,0B480912,11080
B48,5009120D,100B380B,09120B11,0B280B58,
120D1118,180B6009,0B11200B
 1410 DATA 18090D0A,080B480B,1031280B,28
11900B,090D300B,0B181158,0F080F20,58090D
0B,180B2011,080F0B0F,2811600D,081F100B,0
A11380F,40110A09,080F080F,1D09380F,0B301
10A,130A0968,0B28110A,0B203970,091011A0,
21183908,11201108,0F080910
 1420 DATA 180F1B15,200F2809,0B091011,13
150B0F,0A090A0F,200F280F,0F0A1F11,0F0B0D
1A,0F0A090A,13112F28,1011E1BA,19A5
 1430 REM CODE
 1440 DATA 431
 1450 DATA 1E8D30A9,171F8D17,A917208D,17
3D8D33,828505A9,2016C320,772015ED,2080A2
15,22A21616,F72017A0,A032A214,14F72017,1
7A013A2,2014F720,302013DD,2004A213,3DAD1
5DF,D030C917,12104C03,80A580E6,03D082C5,
A0166820,9100A988,209EA270
 1460 DATA 03F013D4,A2122F4C,13D420BD,5F
4C03F0,20B7A212,03F013D4,A2128B4C,13D420
97,A94C03F0,20EFA212,03F013D4,A212C720,1
3D420AE,D02003F0,20C8A212,03F013D4,A212D
920,13D420CD,E1200AF0,173DAD12,5CF030C9,
70B188A0,08D006C9,A913DD20
 1470 DATA 16B22001,0FD003C9,A9161F20,FF
EE2007,03D07FC6,AD135B4C,1CD01777,A212E1
20,2016A0F1,82A2150F,A215DF20,2017A003,D
D20150F,113D4C13,05B014C9,EE2014A9,A988A
0FF,20709104,0E20135B,113D4C14,17A03FA2,
2015CB20,00A9134A,81E68185
 1480 DATA 09C981A5,232006F0,121E4C15,A0
16C34C,C970B187,C915F005,C90EF001,C60AF0
```

Get it right!

```
  10 =    0 0 | 280 = 9B57 C | 550 = 39F3 0
  20 =    0 0 | 290 = 1923 A | 560 = 70C6 B
  30 =    0 0 | 300 = 50BF 2 | 570 = DBEF F
  40 = 8AFC C | 310 = AEF6 9 | 580 = 3FC9 4
  50 = 2336 F | 320 = D72D F | 590 =    0 4
  60 = A022 B | 330 = B5F5 1 | 600 = B9AB 2
  70 = E8A7 0 | 340 = DCE3 E | 610 = 97A2 9
  80 = E2E5 2 | 350 = F728 A | 620 = 5386 F
  90 = FD2E 5 | 360 = E38B 5 | 630 =  60B 3
 100 = DA59 A | 370 = 342A F | 640 = A68A 3
 110 = 91B1 C | 380 = 7F15 A | 650 =    0 3
 120 = A734 5 | 390 = 9B57 B | 660 = 1DFF A
 130 = B850 4 | 400 = FD2E 6 | 670 =    0 A
 140 = 4F52 B | 410 = D4A2 7 | 680 = 34AE 4
 150 = B5B3 6 | 420 = E93C 2 | 690 =    0 4
 160 = F511 9 | 430 = 3F91 5 | 700 = 302E 7
 170 = B18A 3 | 440 = 5FDA D | 710 = 1171 2
 180 = 3EB9 4 | 450 = 3B8D B | 720 = 7BF6 2
 190 = 7610 9 | 460 = 77C6 C | 730 = 8B6E 0
 200 = 2DB7 8 | 470 =    0 C | 740 = B488 9
 210 = B799 9 | 480 = 4F14 F | 750 = 9D4A 9
 220 = 752D 7 | 490 = E47E 3 | 760 = 8300 A
 230 = 5900 B | 500 = B6F4 E | 770 = 3B92 3
 240 = 6CFE 3 | 510 = 8292 D | 780 = CA22 A
 250 = CAC8 C | 520 = AB4A 9 | 790 = ED0F 1
 260 = 5900 B | 530 = 4638 D | 800 =    0 1
 270 = 6CFE 8 | 540 = 45C2 A | 810 = F624 2
```

```
 820 = 5218 1 | 1090 =    0 E | 1360 = 2857 6
 830 = F13C 1 | 1100 = B813 B | 1370 = 4BE9 0
 840 = D3D7 A | 1110 = 60AE 2 | 1380 =    0 0
 850 = 85A7 3 | 1120 = 8F98 0 | 1390 = 3CED 1
 860 = D3E0 C | 1130 = B86B D | 1400 = 74D1 0
 870 = 5C2A D | 1140 =    0 D | 1410 = 23C0 D
 880 = B5B8 9 | 1150 = FBC5 A | 1420 = 89DE 3
 890 =  F2A B | 1160 = 273F 1 | 1430 =    0 3
 900 = 884F 9 | 1170 = 1995 8 | 1440 = E456 F
 910 = 41F2 3 | 1180 = 9FED 1 | 1450 = 944B 6
 920 = D20E 7 | 1190 = F563 7 | 1460 = BC70 C
 930 = E87D 7 | 1200 =    0 7 | 1470 = 4D8B 2
 940 = D76B 7 | 1210 = 5A90 C | 1480 = 33F9 B
 950 = AF62 3 | 1220 = 50CF 4 | 1490 = 336E 6
 960 = A022 8 | 1230 = 53B5 9 | 1500 = C0C3 D
 970 = 8187 F | 1240 = 6E62 E | 1510 = 3315 D
 980 = E2E5 7 | 1250 = 2D8C E | 1520 = ED23 6
 990 = FD2E 5 | 1260 =    0 E | 1530 = 265A 6
1000 = 4DFD 8 | 1270 = 9B1C 0 | 1540 = 5EB7 A
1010 = 321F 6 | 1280 = C0AF 2 | 1550 = 2BD6 5
1020 = C0D6 3 | 1290 = E5C0 9 | 1560 = 35FA A
1030 = 3364 9 | 1300 = 8203 4 | 1570 = CB40 D
1040 = 7187 C | 1310 = C4B5 E | 1580 = 1C8E 4
1050 = 78E2 B | 1320 =    0 E | 1590 = F5A9 1
1060 = BAD9 D | 1330 = E8A9 4 | 1600 = 432B 2
1070 = EFF2 7 | 1340 = E86D 3 | 1610 = 5162 0
1080 = ED0F E | 1350 = DEB3 5 | 1620 = ED0F 1
```

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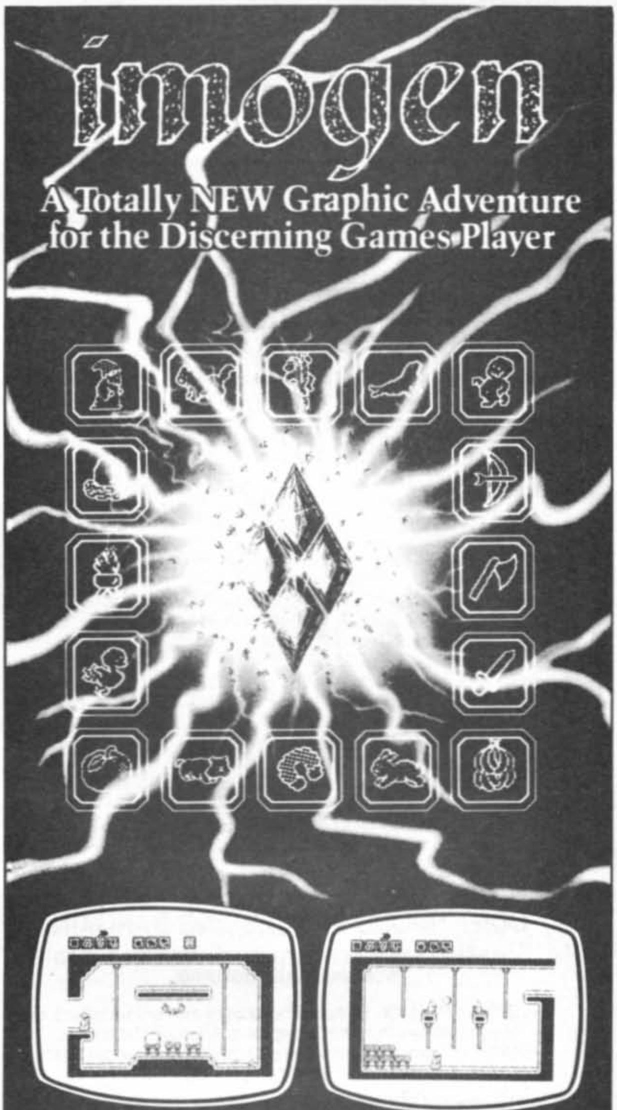
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```
07,C970A570,C602D0FF,11B44C71,70B186A0,0
5A9F7D0,87A07091,709100A9,A0123F4C,C970B
189,C911F005,C90AF001,E606F007,E602D070,
11B44C71,70B18AA0,05A9F7D0
 1490 DATA 89A07091,709100A9,A0126F4C,C9
70B167,C913F005,C90FF001,380BF007,21E970
A5,02B07085,B44C71C6,B1A9A011,F005C970,F
001C913,F007C90F,70A5180B,70852169,71E60
290,A911B44C,A001A2D2,FFF44C00,00A2D2A9,
F44C00A0,20CCA2FF,F9F013D4
 1500 DATA 2002A960,88A016B2,709100A9,A2
135B20,16162080,13A009A2,A215BD20,161620
06,EE20E0A9,2014A2FF,08A915DF,A2FFEE20,1
6162007,EE20E1A9,2014A2FF,08A915DF,A9FFE
E20,FFEE2020,C9173DCE,6001D030,708590A9,
71852BA9,162007A2,A012A216
 1510 DATA 15BD2007,4C173DAD,78A9149C,17
A97885,79A97985,17A97A85,A5607B85,13788D
70,798D71A5,8520A913,8556A990,8500A991,A
900A292,BD938500,0A0A9999,93260A0A,69932
60A,13928D00,936518A9,A013938D,9999B900,
C0C89091,18F6D020,206990A5
 1520 DATA 91A59085,91850069,D009E0E8,78
AD18C6,8D216913,79AD1378,8D006913,A51813
79,85606990,6991A590,E6918501,C992A592,6
09ED009,81A9FFA0,8AFFF420,A29BA960,FFF42
0F5,07A001A2,A215BD20,16162080,778DC8A9,
8500A917,8D32A980,30A9172E
 1530 DATA 8D172F8D,95201730,4C03A216,00
A915DF,4DA98185,2FA97885,04A07985,05C978
B1,AA9854D0,A8216918,28F078B1,04F005C9,4
0D003C9,B188A88A,9809D078,A8216918,10F07
8B1,B1C8A88A,9829D078,A8216918,20D078B1,
789105A9,189881E6,B1A82169
 1540 DATA D004C978,A9A88A09,4C789100,A8
8A12E1,789100A9,C0C8A88A,38A1D01E,21E978
A5,79A57885,798500E9,8ED02BC9,F3C978A5,8
1A588D0,00A905F0,6016B24C,549020C9,A9174
88D,A048A20A,FFF12017,EE2017A9,20FEA9FF,
00A2FFEE,201749BD,EE20FFEE
 1550 DATA 04E0E8FF,17A9F2D0,A9FFEE20,FF
EE20FF,201749BD,EE20FFEE,08E0E8FF,FEA9F2
D0,A9FFEE20,FFEE200A,EE2008A9,20FFA9FF,0
BA9FFEE,86FFEE4C,A07D847C,C97CB100,840BF
00D,149C2076,4CC876A4,866014FD,A07D847C,
C97CB100,2007F00D,4CC8FFEE
 1560 DATA A9601515,A9778504,85738579,85
48A975,8540A972,B100A074,C8749172,7BA9F9
D0,75857385,7485C0A9,7285C8A9,749172B1,A
2F9D0C8,15DF2003,CBD077C6,1DA00DA2,A215B
D20,16162080,162001A2,B100A016,149C2078,
A216034C,16162084,0EA004A2
 1570 DATA A215BD20,2017A0B0,04A2150F,BD
2018A0,A0B0A215,150F2017,77850FA9,77A404
A2,A915BD20,FFEE2020,77A40EA2,A915BD20,F
FEE2020,77A577E6,E0D019C9,201FA960,208AF
FEE,2098FFEE,8660FFEE,A07D847C,997CB100,
0DC91778,4CC804F0,A06015D1
 1580 DATA 2000A97D,D088FFEE,F3D0CAF8,16
612060,17A06FA2,A2150F20,16162080,17A051
A2,A014F74C,AA78B100,78917AB1,D00DC9C8,9
18A88F7,11A96078,8AFFEE20,ADFFEE4C,39C91
720,20EE06F0,16494C17,C9171FAD,EE0BF039,
30A9171F,4C17208D,1EEE1649
 1590 DATA 8D30A917,208D171F,2007A217,80
A21616,A2161620,201DA00A,1EA215BD,F74C17
A0,A064A214,150F4C17,AD1777CE,30C91730,3
0CE06F0,16954C17,C9172FAD,CE0BF030,39A91
72F,4C17308D,2ECE1695,8D39A917,308D172F,
A006A217,15BD2007,162007A2
 1600 DATA 2080A216,2EA21616,F72017A0,85
00A914,0A0A6080,9869180A,6917A9AA,07A9A8
00,A0FFF14C,8530A908,8500A979,A9818578,1
8789100,086978A5,02907885,79A579E6,EB908
0C9,02A27784,A415DF20,D5108877,1F081160,
554F0B04,464F2054,4D495420
 1610 DATA 1F0D2145,20200B04,20202020,20
202020,1F0D2020,05111D06,3A726353,303007
11,011F0D30,54051107,3A656D69,30320711,0
C1F0D30,4C051107,73657669,540D333A,45204
548,0D20444E,00000000,00000000,03031F00,
69440311,6E6F6D61,75512064
 1620 DATA 0D747365,00000117,00000000,1C
0D0000,00131C00,000D1A0C,20202020,202020
20,20202020,20202020,20202020,20202020,2
0202020,20202020,FFFA0010,0005000C,00010
011,000A000A,FFF10000,000A0005,20202020,
20202020,0D202020,2BE79
```

This listing is included in this month's tape & disc offer. See order form on Page 151.

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LETTERS

£10 Prize letter

Save paper with neater print

I HAVE often needed a compact way of printing text, and usually the compressed function on my printer has been suitable. However, I recently needed to shrink some text, keeping the same proportions as normal pica printing.

By adding the long thin compressed text and the short fat subscript text, a pleasing mini-pica style is created. The line feed is then altered to suit this text, and the result is a neat, readable and paper-saving style. I find it most useful when listing very long programs – most can fit on two pieces of paper.

This was written for the Amstrad DMP 1000 printer and should work with all Epson-compatibles.

```
   10 REM - Reset Printer -
   20 VDU 2,1,27,1,64
   30 REM - Set feed to 16/216
inch -
   40 VDU 1,27,1,51,1,16
   50 REM - Select Compressed
Text -
   60 VDU 1,27,1,15
   70 REM - Select Subscript -
   80 VDU 1,27,1,83,1,48
   90 REM
  100 PRINT "Very small
text""Small is beautiful!"
  120 VDU3:END
```

– **Richard Tate, Stockport.**

Catalogue clanger

I WOULD first of all like to congratulate you on your fantastic magazine Micro User. *I have found it very interesting and informative to read.*

However, after spending three days typing in your Disc Cataloguer program, I have encountered various problems.

Initially I could not get the SETUP program to work because line 490 is END but it should be ENDPROC.

The Backup option doesn't seem to work at all and I have had to change the OPENUP command to OPENIN before any files could be opened, why is this? – **S.M. Atkinson, Durham.**

● The altered ENDPROC was due to our typesetting machine losing characters again – this should now be fixed. The OPENUP command is not available on Basic I which you obviously have, but OPENIN performs the same function in this case.

Finally, your problem with line 2870 is a fault in the program – we didn't check the BACKUP routine. It should read:

```
 2870 X$=STR$(Z%):PROCoscli(
"K.0s%=&900:M$s%=""BACKUP 0
""+X$:L:MX%=0:MY%=&9:M*EN.:M
CALL&FFF7:L:M")
```

Why is C neglected?

I CAN'T be the only BBC Micro user who would like to use the C language in his home machine. It is hard to explain the lack of this important language from the otherwise comprehensive range of languages for the BBC micro. Why is this? – **D.C.M. Carter, Brandon, Warwickshire.**

● The most likely reason is the implementation of BCPL which was the forerunner of C – but I'd like to C it too.

Challenger clash

I AM the owner of a BBC Model B with an Opus Challenger 3 disc drive.

I recently purchased a 5.25in disc copy of Superior Software's Collection Volume 1. On receipt I found that I could not boot up the disc, and it was impossible to load the games by using any of the individual file names.

Suspecting a faulty disc I telephoned Superior Software and was amazed to find that this disc was not compatible with the Opus Challenger 3: The only reason I could get out of them was one of hardware incompatibility – the same applies for Volume 2 disc.

The next stage was to telephone Opus, but unfortunately they didn't seem too interested. They already knew that the problem existed and didn't propose to do anything about it, they said that the protection was too complex on Superior Software's discs.

I think that this information should be brought to the attention of your readers, whether owners or prospective buyers of the Opus Challenger 3 system.

I must point out, also, that I have no other complaints regarding the Opus Challenger 3, in fact it has some extremely useful features. – **M. Garner, Northants.**

● Unfortunately, games manufacturers need to protect their discs and this involves taking control of the loading and saving of games. Where a non-standard filing system is in use it is a matter of course that the protection will prevent proper operation.

Spaced out Interword

*LIKE John Surridge (*The Micro User *April 1986) I find Interword not entirely faultless, nor bugless when it comes to reloading certain Menu 5 settings, but nevertheless quite wonderful.*

With regard to the problem of how to put single spaced text into double spaced documents without upsetting the paging, I would like to suggest that he compose the relevant passages using double length rulers and let each Interword line represent two on the printer.

He can then use the printer's right margin for the intermediate carriage returns, and a spare style setting (Dotted, Bold or Underline) to control line feed amounts.

This restricts the line width on the printer to 60 characters (half the maximum Interword line width) and will only work well with left-aligned text. On-screen the change of layout though inaccurate, is obvious.

Temporary printer margins chosen to position and to define the width of the print field should be set by codes embedded on an empty line above the section to be treated.

As some reformatting will be necessary, a tab can be set at the Interword column where each second line will start – this would include the left margin and the line length – and by working down the text any word which overhangs this column can be aligned using the Tab key.

If the text ends in the left column the blank complementary line must be produced, by tabbing a space into the column position. New paragraphs within this section may also need to start here.

The whole passage (including the extra space if any) should be marked as a style change (the one you have chosen). The start codes in Menu 6 is defined with codes for normal line spacing (1/6 inch), and the end codes as half line spacing (say 6/72

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Win a tenner

● Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Writers of the most interesting letters receive a £10 prize.

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inch). In Interword the codes are apparently sent at the beginning and end of every printed line, so the intermediate feeds will be normal, and the twin Interword feeds will be halved throughout.

Finally, codes should be embedded in another empty line beneath the text to restore normal printer margins and line spacing (in that order) to their normal values.

If the final complementary line is not a blank and the slight gap difference above and below the text proves annoying, a 9/72 inch line space instruction can be added to the embedded codes at the top, and the setting in the lower position changed to 15/72 inch. Normal spacing can then be restored on the following line. – **Nigel Garvey, Warwick.**

WYSIWYG en Francais

£10 Prize letter

FOLLOWING R.K. Quigg's letter in the February issue of The Micro User *asking about French WYSIWYG I have written a program to give it in View.*

It intercepts Oswrch and gives the computer the same character set as the printer, in this case the French character set. As it stands the code is stored at &C00 which is not normally used for word processors.

*Type in the program and save it. When run the machine code will be saved as WIZI. Next enter the word processor and type MODE 3 Return *RUN WIZI Return.*

The program will only work with printers capable of producing international character sets. – **Philip Shorter, Eastbourne, New Zealand.**

```
  100 REM French Characters
  110 REM By Philip Shorter
  120 REM (c)The Micro User
  130 REM -----------------
  140 VDU23,224,32,0,60,6,62
,102,62,0
  150 VDU23,225,0,8,20,8,0,0
,0,0
  160 VDU23,226,0;0,60,102,9
6,102,60,96
  170 VDU23,227,0,28,32,60,3
6,60,4,56
  180 VDU23,228,4,0,60,102,1
26,96,60,0
  190 VDU23,229,32,0,102,102
,102,102,62,0
  200 VDU23,230,32,0,60,102,
126,96,60,0
  210 VDU23,231,0,102,102,0,
0,0,0,0,0
  220 wrchv=!&20E AND&FFFF
  230 FOR L%=0 TO 2 STEP 2
240 P%=&C40:[OPT L%
250  LDA #wizi DIV256
260  CMP &20F:BNE do:RTS
270 .do STA &20F
280  LDA #wizi MOD256
290  STA &20E:RTS
300 .wizi
310  PHP:PHA:STA char
320  TXA:PHA:TYA:PHA
330  LDA char:CMP #2
340  BEQ charset
350  LDY #0:LDX #224
360 .loop CMP table,Y
370  BEQ print:INY:INX
380  CPY #8:BNE loop
390 .end
400  PLA:TAY:PLA:TAX
410  PLA:PLP:JMP wrchv
420 .print STX char
430  LDA #&75:JSR &FFF4
440  TXA:ROR A:BCS end
450  PLA:TAY:PLA:TAX
460  PLA:PLP:LDA char
470  JMP wrchv
480 .charset LDA #2
490  JSR wrchv:LDY #0
500 .cloop
510  LDA cset,Y:JSR wrchv
520  INY:CPY #6:BNE cloop
530  PLA:TAY:PLA
540  TAX:PLA:PLP:RTS
550 .cset NOP:NOP
560  NOP:NOP:NOP:NOP
570 .char BRK:.table
580 ]:NEXT
590 FOR L%=P% TO P%+7
600 READ ?L%:NEXT:P%=L%
610 DATA 64,91,92,93
620 DATA 123,124,125,126
630 FOR L%=cset TO cset+5
640 READ ?L%:NEXT
650 DATA 1,27,1,82,1,1
660 *SAVE WIZI C00+B9 C40
```

Pounding the printer

I USE both Citizen 120D and Epson FX80 printers and have set up both as the manuals instruct to print English characters. Unfortunately when either printer sees an £ it prints a back sloping apostrophe.

I have confirmed with the suppliers of the Citizen that I have set the DIP switches correctly and they cannot shed any light on the problem. Could you offer any solution? – **L.F. Sheldon, Grantham, Lincs.**

● In the BBC Micro the £ sign has an Ascii value of 96, which your printers treat as the back apostrophe. To get a £ sign directly you must use the # symbol, but most word processors have facilities to alter the code sent to the printer when an £ sign is required.

Shifting to lower case

I WOULD like to draw your reader's attention to an undocumented but very useful feature of the BBC Micro series. I have never seen it mentioned in any BBC manuals and discovered it when reading about the Electron.

It is simply this: If you press Shift+Caps Lock, anything you type will be in uppercase unless the Shift key is also pressed, in which case it will be in lower. I find this invaluable, when typing in listings with lower case variable names where most, but not all, of the text is in uppercase. – **R. Hayron, Brixham, Devon.**

*Cat cutting corners

*AFTER using the program GRAPHITO, I entered Wordwise Plus, designed a poster and saved it to disc. Then just to check that it had gone on to the disc (I never quite trust it) I typed *CAT. The file name should have been POSTER3, but the results of *CAT showed that it had saved as TER3 – the first three letters had been wiped off. Subsequent attempts to save the file gave similar results.*

*On attempting to LOAD the file I got the error message no such file. Closer examination revealed that the files in question were shown indented on the screen when I typed *CAT. *INFO * showed similar oddities. I had to turn the computer off and start again to get it to work normally.*

I can only think that some odd control codes have been added to the file name. All my attempts to access these files have failed. – **D. Cates, Herne Bay, Kent.**

● Your analysis of the problem is quite correct although the reason for it is just one of those things. The program given here should resolve the situation, it works by reading track 0 sector 0 (the catalogue) and changing any control character to a changing series of letters. However I notice from your printout you are using a double density DFS so I cannot guarantee this will work.

```
100 REM CAT repair
110 REM -----------
120 DIM s%&100,c%20
130 PROCrd(1):N%=s%?5
140 IF N%=0 END
150 PROCrd(0):A%=63
160 FOR L%=8 TO N%+7
170 A%=A%+1:B%=s%?L%
180 IF B%<32 s%?L%=A%
190 NEXT:PROCwr(0):END
200 DEF PROCrd(S%):P%=&53
210 DEF PROCwr(S%):P%=&4B
220 c%?0=0:c%!1=s%:c%?5=3
230 c%?6=P%:c%?7=0:c%?8=S%
240 c%?9=&21:c%?10=0
250 X%=c%MOD256:Y%=c%/256
260 A%=&7F:CALL&FFF1
270 IF c%?10=0 ENDPROC
280 PRINT"Error at 0/";S%
290 ENDPROC
```

LETTERS

Page poser with ADFS

I HAVE recently bought Acorn's ADFS rom and am having problems as Page now defaults to &1F00. I am aware that this does not happen on the Master so is it avoidable? – **V.Marks, Mexborough, S. Yorks.**

● The Master has an area of private ram for the filing systems so PAGE is always set at &E00. The B+ does not have this ram – and even if it did does not have the software support for it in the MOS – so nothing can be done.

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

Sham semantics

I READ the syntax article in the May issue of The Micro User *with interest but have to question the logic when correcting the *DRIVE and *FORM descriptions.*

Firstly, if the triangular brackets <> indicate non-terminal symbols (that is the parameters for commands) then everything following a terminal symbol should be enclosed in triangular brackets. 40 & 80 are not terminal symbols hence your version of the syntax:

```
*FORM (40/80) (<drive>)
*DRIVE <drive> ((40/80))
```

cannot be correct. Also, since / is an option separator there is no need to state twice that there is an option, hence ((40/80)) is tautology.

*Confusion arises because of the technical definition for <>. In practice, if one takes these brackets to mean "insert your own name or value for this symbol" then all is well. With such a definition then your verion of *FORM is correct the ACCESS <afsp> (L) of Mr Strange's DFS is correct and *DRIVE would be *DRIVE <drive> (40/80).* – **Peter Noble, Old Glossop, Derbyshire.**

● *Steve Turnbull replies:* I don't quite understand your point about everything after a terminal symbol being enclosed in brackets, since a definition can consist of any number of terminal and non-terminal symbols in any sequence.

By your own definition 40 and 80 must be terminal symbols since they cannot be changed and the double brackets are (theoretically and perhaps pedantically) required because single brackets implies one must be chosen – but it can be left out.

Routine addresses

WHILE working on the multiplication and division routines I have manged to sort out the addresses of a number of routines for Basic IV in the Master:

BEFE	cold start
8F83	Warm start
8DB2	Tokenise line
BB15	Insert line in program
BA98	Delete line in program
80CD	Search for program line.
BDE5	Set TOP check or Bad program
8EE0	Get character at PTRA
8ED5	Get character at PTRB
9BA6	Check for end of statement
9005	Continue execution
8FAE	Skip rest of line
9D2F	Get numeric or string at PTRA
9D3B	Get numeric or string at PTRB
A2E1	Get number at PTRB
9B1E	Get tokenised line number
BA70	Input string to SWA
BD37	Print contents of accumulator as character/token
BD6C	Print contents of accumulator as hex number
A081	Print IWA as a decimal integer
A085	Print IWA as a line number (5 digit field)
BECF	Print string following JSR
8185	Convert integer to real
96C3	Convert real to integer (decimal or hex)
A118	Convert number to string
AB4E	Convert string to number
AA21	rnd(0)
AA1E	rnd(1)
AA78	rnd
AA69	rnd(-X)
AA52	rnd(X)

I have also discovered that Basic IV uses &4A;4B as a pointer where Basic I and II both use &4B;4C.

Mark Plumbley's Basic Rom User Guide published by Adder is a great help in using these routines, although it refers to Basic 1 and 2 of course. – **B.J. Kilby, Stratford upon Avon.**

Ten minute game

£10 Prize letter

IT SEEMS that every game in The Micro User *is over 40 lines long, a very daunting task for slow typists. So I decided to write a short game. It isn't very user-friendly, but I find it quite addictive.*

The object of the game is to avoid the oncoming blocks by moving your spaceship left and right using Z and >. Life would be easy, but the blocks get wider. My best score is 4867.

The game scrolls by using the PRINT statement, which results in slightly jerky graphics. The blocks come in random positions at the bottom of the screen and scroll up. The spaceship moves smoothly by being printed at the graphics cursor instead of the normal text cursor. The score is given simply in hundredths of a second.

The game could be very simply improved, but that would make it longer. The program as it is can be typed in in about 10 minutes easily. Good luck! – **Huw Woolley, Norwich, Norfolk.**

```
    1REPEATMODE2:A%=500:C%=
1:VDU23;8202;0;0;0;:VDU23,2
45,90,60,24,60,126,126,60,2
4:FORK%=1TO30:PRINT:NEXT:TI
ME=0:REPEATR%=30+(TIME/100)
:X%=RND(1100)
    2GCOL0,RND(6)+1:MOVEX%,
0:MOVEX%,100:PLOT85,X%+R%,1
00:MOVEX%+R%,0:PLOT85,X%,0:
PRINT:PROCA
    3UNTILC%=0:PRINTTAB(5,1
0);"SCORE:="TIME:FORK%=1TO1
0:FORJ%=1TO255STEP8:SOUND&1
1,-15,J%,1:NEXT:NEXT:REPEAT
UNTILGET=32:UNTILFALSE:END
    4DEFPROCA:VDU5:GCOL 0,7
:MOVEA%,1020:VDU245:IFPOINT
(A%+20,980)<>0 C%=C%-1:SOUN
D0,-10,5,1
    5A%=A%+30*INKEY-98-30*I
NKEY-104:VDU4:ENDPROC
```

A ruler with a view

*I'M writing in response to the query from Dr. E. Latusek (*The Micro User *May 87) concerning the use of the Ruler utility (*The Micro User *Nov 86) with a second processor.*

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◀ From Page 148

*I have a PMS 6502 second processor and found that Ruler worked with no other modification than the use of O%, together with the required changes to the OPT command and the *SAVE command. I set O% to &C4A0 so that with View 2.1 it would sit in space that View does not use, but with View 3 it would sit just below the relocated code.*

I have no experience with Hi-View but since it allows 47k of text it presumably loads somewhere above &C000 (View 3 loads at &C5C8 giving 48k of text) so I can see no reason for Ruler not to work if positioned just below the Hi-View code (say at &BF00).

The changes to the listing that I used are:

```
110 FOR PASS=0 TO 7 STEP 7
120 P%=&C00:O%=&C4A0
660 *SAVE HI-RULE C00+100 C4A0
C4A0
```

*I ran Ruler with the second processor inactive to assemble the code, saved it and then I simply added *HI-RULE to my !Boot file. To assemble the code with the second processor active simply set PAGE anywhere above &D00 before running the source program.*

My thanks to The Micro User *for this very useful utility. I don't know how I coped without it.* – **Keith Baxendale, Glasgow.**

More on the biomorphs

THANK YOU very much indeed for your Biomorph program. I remember thinking while watching the programme The Blind Watchmaker that such a thing could be done on my BBC Micro, but not by me!

Unfortunately, the program as it stands leans more towards the hopeful monster hypotheses and leaves no room for M.Kimura's postulations on genetic drift. That is, the trend of some changes to accumulate and push a genotype (crudely a collection of genes responsible for a particular phenotype of physically quantifiable expression), still within the constraints of natural selection.

In other words, a particular element of a creature's makeup does not necessarily bear a selectively useful function, as long as it is in no way detrimental either.

This is the so-called Neutral Theory and consists of a lot of populations genetics work, which means hard sorts of calculus (which I don't even begin to understand) and would probably leave only enough room for Mode 7 work on the BBC Micro, as well as meaning long processing times.

However, the model used is more than good enough for demonstration purposes, and the one I mentioned is still highly controversial.

At the natural selection end though your program could be readily argumented. Your program works purely on the level of artificial selection and is therefore more analogous to pigeon fancying and show dog/cat breeding. A more natural way would be to randomise selection, something I have tried and found quite interesting.

What I did was simply to replace:

```
A$=GET$
C%=ASCA$-&40
```

with:

```
C%=RND(11)
```

However, I can't manage to get a trap into this for the selection of PROCREVIEW.

Only one element of tidiness remains. In nature the natural selection forces are the result of many different random factors leading to one resultant environment. Naturally BBC Basic's RND command is not sophisticated enough to emulate this, though I believe there are better algorithms written which would be more suitable.

Could someone please write the additions to your biomorph program encompassing the above? – **J. Greaves, Kings Heath, Northampton.**

Too many Cooks

WHAT a pleasant surprise it was to see my old mate Mike Cook's face smiling happily out of pages 97 and 98 of the June edition of The Micro User.

It has been a long time since I saw him looking so fuzzy: The last time being at 3am on a Sunday morning on the moors overlooking the Rossendale Valley.

It was the weekend of an amateur radio contest and Mike, myself and several other members of the local radio club were taking part in a DX contest.

As well as using radio we were also trying to pull slow scan television pictures from various parts of Europe. We were using an Electron, which Mike had programmed in his own inimitable way, to resolve the pictures.

Mike looked then almost exactly as he does in your magazine. Several club members tried to adjust his horizontal hold before they realised that it was the great man in person and not a televised image.

Keep up the good work. How about some better shots in a future edition? I think you need to put a Goverment health warning on the front cover though. – **Ken Hughes, Rossendale, Lancs.**

● We're sorry about the quality of the pictures – it was nothing to do with the digitiser which works perfectly as you can see from the picture on this page.

Left-handed masterpieces

MY Epson P-40 printer works well on text applications but not when dumping a graphics screen using the AMX Art package.

It only prints the left hand half of the screen image and starts from the centre of the paper.

Have you any information to rectify this problem, or for a screen dump capable of utilising the full width of paper and printing out a full screen?

At the moment I have to confine my AMX Art masterpieces to the left hand half of the screen. – **P.Mort, Harwood, Bolton.**

● Several of our readers have reported this. Has anyone found the solution?

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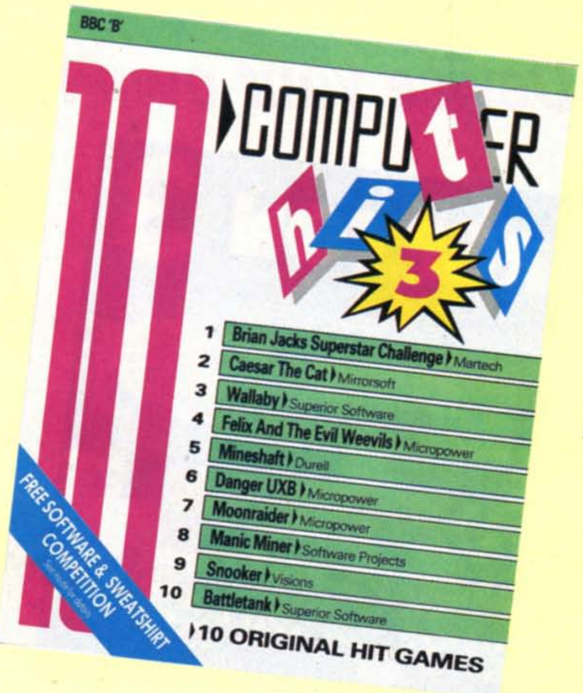
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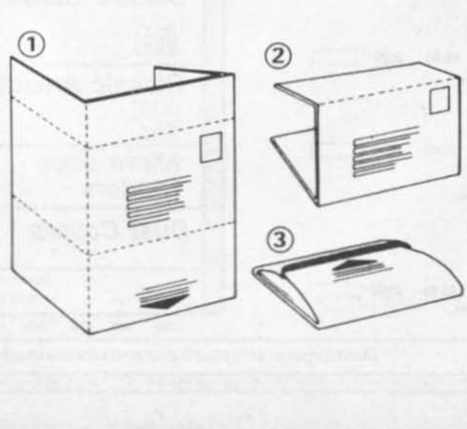

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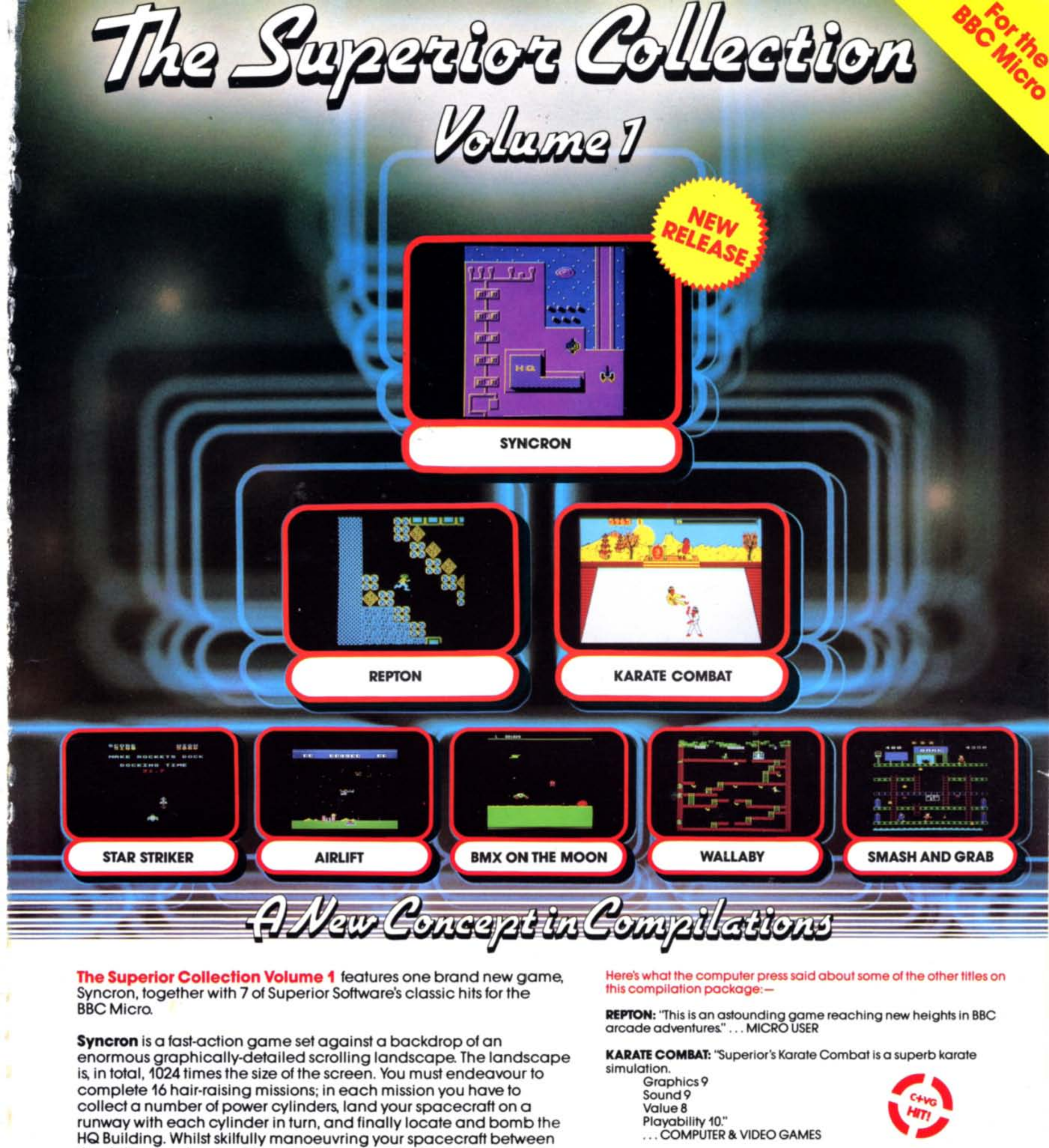

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